Appendix B

Assumptions and Calculations for TRA-63

Appendix B

Assumptions and Calculations for TRA-63

Assume that two scenarios are apparent at TRA-63, as follows:

1. The entire abandoned 4-in. pipeline is full of resin.
2. The 4-in. pipeline has been releasing wastewater to the soil column since 1997.

B-1. Scenario 1

Assumptions for Scenario 1 are as follows:

1. The interior dimension of the pipeline is the same as the exterior dimension.
2. The entire contents of the pipeline was released to the soil at the depth of the pipeline (approximately 6 ft below the ground surface).
3. The density of the resin is 1.13 g/cm^3.
4. The release of the resin will not affect the moisture content of the soil.
5. The released resin will not penetrate the soil but will remain at the depth at which it was released.
6. The released resin will be evenly distributed over the entire impacted soil area.
7. The resin is contaminated with the concentrations of radiological constituents shown in Table B-1:

Table B-1. Concentrations of radiological constituents contaminating resin at TRA-63.

Radiological Constituent	Concentration (pCi/g)[B1]	Radiological Constituent	Concentration (pCi/g)[B1]
Cr-51	7,000	Cs-137	660
Mn-54	89	Eu-152	520
Co-57	390	Eu-154	460
Co-58	114	Eu-155	156
Co-60	10,300	Hf-181	800
Nb-95	710	Fe-59	19.5
Zr-95	450	Zn-65	370
Ce-141	14.5	Ru-103	54
Ce-144	190	Ru/Rh-106	218
Cs-134	77	Ta-182	77

B-2. Soil Concentration Calculation for Scenario 1

The line is approximately 73 ft of 4-in. Duriron pipe between TRA-605 and the former location of the 30-in. warm waste pipeline. The maximum volume of the pipeline was estimated by:

$V = \pi r^2 L$

where

Pi (π) = 3.14

r = the radius of the pipe

L = the length of the pipe.

The maximum volume of the pipe is 6.37 ft^3. Converting this to gallons, the volume of the pipe is estimated to be 47.65 gal. This is the maximum quantity of radiologically contaminated resin that could be contained within the 4-in. pipeline.

The maximum mass of resin that could be contained in the pipe can be determined by multiplying the maximum volume of the resin (6.37 ft^3) by the density of the resin (1.13 g/cm^3), resulting in a total mass of resin of 2.04E+05 g (Table B-2) or 204 kg.

Therefore, the soil area that would be impacted by a release of radiologically contaminated resin is 6.37 ft^3.

Table B-2. Concentrations of radionuclides in the resin (C_R) at TRA-63.

Radionuclides in Resin (C_R)	Concentrations (Totals)
C_R of Cr-51	7,000 pCi/g × 2.04E+05 g = 1.43E+09 pCi Cr-51
C_R of Mn-54	89 pCi/g × 2.04E+05 g = 1.81E+07 pCi Mn-54
C_R of Co-57	390 pCi/g × 2.04E+05 g = 7.95E+07 pCi Co-57
C_R of Co-58	114 pCi/g × 2.04E+05 g = 2.32E+07 pCi Co-58
C_R of Co-60	1.03E+04 pCi/g × 2.04E+05 g = 2.10E+09 pCi Co-60
C_R of Nb-95	710 pCi/g × 2.04E+05 g = 1.45E+08 pCi Nb-95
C_R of Zr-95	450 pCi/g × 2.04E+05 g = 9.17E+07 pCi Zr-95
C_R of Ce-141	14.5 pCi/g × 2.04E+05 g = 2.96E+06 pCi Ce-141
C_R of Ce-144	190 pCi/g × 2.04E+05 g = 3.87E+07 pCi Ce-144
C_R of Cs-134	77 pCi/g × 2.04E+05 g = 1.57E+07 pCi Cs-134
C_R of Cs-137	660 pCi/g × 2.04E+05 g = 1.35E+08 pCi Cs-137
C_R of Eu-152	520 pCi/g × 2.04E+05 g = 1.06E+08 pCi Eu-152
C_R of Eu-154	460 pCi/g × 2.04E+05 g = 9.38E+07 pCi Eu-154
C_R of Eu-155	156 pCi/g × 2.04E+05 g = 3.18E+07 pCi Eu-155

Table B-2. (continued).

Radionuclides in Resin (C_R)	Concentrations (Totals)
C_R of Hf-181	800 pCi/g × 2.04E+05 g = 1.63E+08 pCi Hf-181
C_R of Fe-59	19.5 pCi/g × 2.04E+05 g = 3.97E+06 pCi Fe-59
C_R of Zn-65	370 pCi/g × 2.04E+05 g = 7.54E+07 pCi Zn-65
C_R of Ru-103	54 pCi/g × 2.04E+05 g = 1.10E+07 pCi Ru-108
C_R of Ru/Rh-106	218 pCi/g × 2.04E+05 g = 4.44E+07 pCi Ru/Rh-106
C_R of Ta-182	77 pCi/g × 2.04E+05 g = 1.57E+07 pCi Ta-182

B-3. Scenario 2

Assumptions for Scenario 2 are as follows:

1. The timeframe that the 4-in. pipeline may have been leaking is from October 1, 1997, through October 16, 2001, for a total of 1,472 days.

2. Tn average of 9,000 gal of warm wastewater flowed through the 4-in. pipeline on a daily basis.

3. The ratio of the surface area of the crack to the cross-sectional area of the pipe was approximately 0.13.

4. Approximately 13% of the discharge through the pipe leaked through the crack for a total of approximately 1,722,240 gal impacting the soil volume.

5. The soil is sandy soil with gravel, with an intrinsic permeability of 1 darcy and a hydraulic conductivity of 1×10^{-3} cm/sec.

6. Density of the soil is 1.855 g/cm^3. This accounts for 70% of the soil as solid material and 30% of the soil as air.

7. The density of the soil is based on dry soil (i.e., there is no moisture in the soil).

8. A moisture content of 5% is the residual saturation after the release of the wastewater. This relates to the degree of penetration of the wastewater.

9. Wastewater and contaminants are evenly distributed throughout the entire impacted soil volume.

10. The radiological constituents are present in the soil at the concentrations shown in Table B-3.

11. The radiological constituents are present in the wastewater at the concentrations shown in Table B-4.

Table B-3. Concentrations of radiological constituents present in the soil at TRA-63.

Radiological Constituent	Concentration (pCi/g)[B2,B3]	Radiological Constituent	Concentration (pCi/g)[B2,B3]
Na-24	0.7	Eu-152	340
Cr-51	450	Eu-154	370
Mn-54	36	Eu-155	117
Co-57	390	Gross alpha	4.9
Co-58	26	Gross beta	1,830
Co-60	4.6E+03	Hf-181	88
Nb-95	84	Fe-59	19.5
Zr-95	41	Zn-65	168
Ce-141	14.5	Ru-103	3.7
Ce-144	28	Ru/Rh-106	218
Cs-134	39	Ta-182	17
Cs-137	550		

Table B-4. Concentrations of radiological constituents present in the wastewater at TRA-63.

Radiological Constituent	Concentration (pCi/mL)[B3]	Radiological Constituent	Concentration (pCi/mL)[B3]
H-3	9.35E+03	Sb-124	0.61
Na-24	3	Cs-137	10.3
Cr-51	57	Eu-152	29
Mn-54	1	Eu-154	29
Co-60	192	Eu-155	10.8
Nb-95	9.1	Gross alpha	0.8
Zr-95	5.9	Gross beta	280
Mo-99	0.5	Hf-181	7

B-4. Soil Concentration Calculation for Scenario 2

Potential volume of wastewater impacting soil = 1,722,240 gal or 230,230 ft^3

Potential volume of impacted soil = 230,230 ft^3 / .05 = 4.60E+06 ft^3 of soil

Soil density = 1.855 g/cm^3

Potential mass of contaminated soil = (1.855 g/cm^3) × (1.303878E+11 cm^3) × (1 kg/1E03 g)= 2.42E+8 kg soil.

2.42E+11 g is the maximum quantity of radiologically contaminated soil that could be impacted at TRA-63 (Table B-5). Since fifteen 55-gal drums of contaminated soil were removed from the site, and each of these drums weighed approximately 787 lb, approximately 5.35E+06 g of contaminated soil were removed from the site. This still may leave approximately 2.42E+11 g of contaminated soil at TRA-63.

Table B-5. Concentrations of radionuclides in the contaminated soil (C_s) at TRA-63.

Radionuclides in Contaminated Soil (C_s)	Concentration
C_s of Na-24	0.7 pCi/g × 2.42E+11 g = 1.69E+11 pCi Na-24
C_s of Cr-51	450 pCi/g × 2.42E+11 g = 1.09E+14 pCi Cr-51
C_s of Mn-54	36 pCi/g × 2.42E+11 g = 8.71E+12 pCi Mn-54
C_s of Co-57	390 pCi/g × 2.42E+11 g = 9.43E+13 pCi Co-57
C_s of Co-58	26 pCi/g × 2.42E+11 g = 6.29E+12 pCi Co-58
C_s of Co-60	4.6E+3 pCi/g × 2.42E+11 g = 1.11E+15 pCi Co-60
C_s of Nb-95	84 pCi/g × 2.42E+11 g = 2.03E+13 pCi Nb-95
C_s of Zr-95	41 pCi/g × 2.42E+11 g = 9.92E+12 pCi Zr-95
C_s of Ce-141	14.5 pCi/g × 2.42E+11 g = 3.51E+12 pCi Ce-141
C_s of Ce-144	28 pCi/g × 2.42E+11 g = 6.77E+12 pCi Ce-144
C_s of Cs-134	39 pCi/g × 2.42E+11 g = 9.43E+12 pCi Cs-134
C_s of Cs-137	550 pCi/g × 2.42E+11 g = 1.33E+14 pCi Cs-137
C_s of Eu-152	340 pCi/g × 2.42E+11 g = 8.22E+13 pCi Eu-152
C_s of Eu-154	370 pCi/g × 2.42E+11 g = 8.95E+13 pCi Eu-154
C_s of Eu-155	117 pCi/g × 2.42E+11 g = 2.83E+13 pCi Eu-155
C_s of Gross Alpha	4.9 pCi/g × 2.42E+11 g = 1.19E+12 pCi Gross Alpha
C_s of Gross Beta	1,830 pCi/g × 2.42E+11 g = 4.43E+14 pCi Gross Beta
C_s of Hf-181	88 pCi/g × 2.42E+11 g = 2.13E+13 pCi Hf-181
C_s of Fe-59	19.5 pCi/g × 2.42E+11 g = 4.72E+12 pCi Fe-59
C_s of Zn-65	168 pCi/g × 2.42E+11 g = 4.06E+13 pCi Zn-65
C_s of Ru-103	3.7 pCi/g × 2.42E+11 g = 8.95E+11 pCi Ru-108
C_s of Ru/Rh-106	218 pCi/g × 2.42E+11 g = 5.27E+13 pCi Ru/Rh-106
C_s of Ta-182	17 pCi/g × 2.42E+11 g = 4.11E+12 pCi Ta-182

1,722,240 gal, 230,230 ft^3, or 6.519E+09 mL is the maximum quantity of radiologically contaminated wastewater that could impact the soil at TRA-63 (Table B-6).

Table B-6. Concentrations of radionuclides in the wastewater (C_w) at TRA-63.

Radionuclides in Wastewater (C_w)	Concentration
C_w of H-3	9.35E+03 pCi/mL × 6.519E+09 mL = 6.21E+13 pCi
C_w of Na-24	3 pCi/mL × 6.519E+09 mL = 1.96E+10 pCi
C_w of Cr-51	57 pCi/mL × 6.519E+09 mL = 3.72E+11 pCi
C_w of Mn-54	1 pCi/mL × 6.519E+09 mL = 6.52E+09 pCi
C_w of Co-60	192 pCi/mL × 6.519E+09 mL = 1.25E+12 pCi
C_w of Nb-95	9.1 pCi/mL × 6.519E+09 mL = 5.93E+10 pCi
C_w of Zr-95	5.9 pCi/mL × 6.519E+09 mL = 3.85E+10 pCi
C_w of Mo-99	0.5 pCi/mL × 6.519E+09 mL = 3.26E+09 pCi
C_w of Sb-124	0.61 pCi/mL × 6.519E+09 mL = 3.98E+09 pCi
C_w of Cs-137	10.3 pCi/mL × 6.519E+09 mL = 6.71E+10 pCi
C_w of Eu-152	29 pCi/mL × 6.519E+09 mL = 1.89E+11 pCi
C_w of Eu-154	29 pCi/mL × 6.519E+09 mL = 1.89E+11 pCi
C_w of Eu-155	10.8 pCi/mL × 6.519E+09 mL = 7.04E+10 pCi
C_w of Gross Alpha	0.8 pCi/mL × 6.519E+09 mL = 5.23E+09 pCi
C_w of Gross Beta	280 pCi/mL × 6.519E+09 mL = 1.83E+12 pCi
C_w of Hf-181	7 pCi/mL × 6.519E+09 mL = 4.56E+10 pCi

B-5. References

B1. Martin, K. F., INEEL, Interoffice Memorandum to J. J. Lopez, October 25, 2001, "RML Gamma-Ray Analysis of one TRA-605 Warm Waste Soil/Resin Sample," KFM-092-01.

B2. Daley, J. A., INEEL, INteroffice Memorandum to L. E. Ewing, October 18, 2001, "RML Gamma-Ray Analysis of TRA-605 Warm Waste Piping Replacement Samples," JAD-079-01.

B3. "Reportable Quantity Calculations for40 CFR 302.6(b) Compliance," October 25, 2001, pp. 1–4.

Appendix C

Decay Correction Table for Radionuclides

Appendix C

Decay Correction Table for Radionuclides

Table C-1. Decay correction for radionuclides at TRA-63.

		Concentration of Radionuclides (Ci)					
		Soil		Resin		Wastewater	
Hazardous Constituent	Half-Life (days)[a]	Sample Concentration[b]	Decay Corrected[c]	Sample Concentration[b]	Decay Corrected[c]	Sample Concentration[b]	Decay Corrected[c]
H-3	4503.45	Unknown	N/A	Unknown	N/A	61.9	54.92
Na-24	0.6233	0.169	0	Unknown	N/A	0.0198	0
Cr-51	27.7025	109	3.93E-07	1.43E-03	5.15E-12	0.378	1.00E-09
Mn-54	312.300	8.71	1.550	1.81E-05	3.23E-06	6.62E-03	1.18E-03
Co-57	271.790	94.3	13	7.95E-05	1.10E-05	Unknown	N/A
Co-58	70.8600	6.29	3.15E-03	2.32E-05	1.20E-08	Unknown	N/A
Co-60	1925.06	1113	841.4	2.10E-03	1.59E-03	1.27	0.9599
Nb-95	34.9750	20.3	4.17E-06	1.45E-04	2.98E-11	0.0603	1.20E-08
Zr-95	64.0200	9.92	2.20E-03	9.17E-05	2.00E-08	0.0391	8.68E-06
Mo-99	2.7475	Unknown	N/A	Unknown	N/A	3.31E-03	2.44E-88
Sb-124	60.2000	Unknown	N/A	Unknown	N/A	4.04E-03	5.26E-07
Ce-141	32.5010	3.51	2.23E-07	2.96E-06	1.88E-13	Unknown	N/A
Ce-144	284.893	6.77	1.022	3.87E-05	5.84E-06	Unknown	N/A
Cs-134	753.652	9.43	4.610	1.57E-05	7.68E-06	Unknown	N/A
Cs-137	10982.6	133	126.6	1.35E-04	1.29E-04	0.068	0.0647
Eu-152	4944.01	82.2	73.71	1.06E-04	9.51E-05	0.192	0.1720
Eu-154	3138.45	89.5	75.38	9.38E-05	7.90E-05	0.192	0.1620
Eu-155	1738.80	28.3	20.76	3.18E-05	2.33E-05	0.072	0.0528
Hf-181	42.3900	21.3	6.46E-05	1.63E-04	4.95E-10	0.046	1.40E-07
Fe-59	44.5030	4.72	2.62E-05	3.97E-06	2.20E-11	Unknown	N/A
Zn-65	244.260	40.6	4.480	7.54E-05	8.31E-06	Unknown	N/A
Ru-103	39.2600	0.895	9.87E-07	1.10E-05	1.21E-11	Unknown	N/A
Ru/Rh-106	373.590	52.7	12.47	4.44E-05	1.05E-05	Unknown	N/A
Ta-182	114.430	4.11	0.0370	1.57E-05	1.42E-07	Unknown	N/A
Gross Alpha	N/A	1.190	1.190	Unknown	N/A	5.30E-03	5.30E-03
Gross Beta	N/A	443	443	Unknown	N/A	1.85	1.85

a. Based on information obtained from http://nucleardata.nuclear.lu.se/nucleardata/toi/perchart.htm.
b. Concentrations obtained from Tables B-2, B-5, and B-6.
c. Decay Equation $A = A^{\circ}e^{-\ln 2t/t_{1/2}}$, where t = timeframe from October 16, 2001, through December 2, 2003 (777 days).

Appendix D

References for Decision Documentation Package

ID--BBWI-ATR-2001-TEMP Draft Notification Report

Occurrence Report

Advanced Test Reactor

(Name of Facility)

Category "A" Reactors

Facility Function

Idaho National Engineering Lab. Bechtel BWXT Idaho, LLC.

(Name of Laboratory, Site or Organization)

Name: SUTHERS, DENNIS W

Title: ATR Operations Facility Manager **Telephone No.:** (208) 533-4333

(Facility Manager/Designee)

Name: OWENS, MARJORIE A

Title: **Telephone No.:** (208) 533-4563

(Originator/Transmitter)

Name: C. D. Brooks **Date:** 10/16/2001

(Authorized Classifier(AC))

1. Occurrence Report Number: ID--BBWI-ATR-2001-TEMP

Failure of Underground 4-Inch Radioactive Warm Waste Pipe and Leakage Discovered During Waste Piping Replacement Construction Project

2. Report Type and Date: Draft Notification Report

	Date	Time (MTZ)
Notification:		
Initial Update:		
Latest Update:		

3. Occurrence Category: Unusual

4. Number of Occurrences: 1 **Original OR:**

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5. Division or Project: Reactor Programs

6. Secretarial Office: Nuclear Energy, Science and Technology

7. System, Bldg., or Equipment: Underground Warm Waste Pipe

8. UCNI?: No

9. Plant Area: South of TRA-605

10. Date and Time Discovered: 10/16/2001 11:20 MTZ

11. Date and Time Categorized: 10/16/2001 13:20 MTZ

12. DOE-HQ EOC Notification:

Date	Time (MTZ)	Person	Organization
10/16/2001	15:20	Matt Hutmaker	DOE-HQ

13. Other Notifications:

Date	Time (MTZ)	Person	Organization
10/16/2001	13:20	Ray Furstenau	DOE-HQ
10/16/2001	13:20	Charles Jones	DOE-HQ

14. Subject or Title of Occurrence:

Failure of Underground 4-Inch Radioactive Warm Waste Pipe and Leakage Discovered During Waste Piping Replacement Construction Project

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15. Nature of Occurrence:

02) Environmental
A. Radionuclide Releases

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16. Description of Occurrence:

On October 9, 2001, while excavating soil for a TRA Warm Waste Piping (30-inch) Replacement project, wet soil was encountered by construction crews in the vicinity of a 4-inch radioactive warm waste line. The soil was determined to be radioactively contaminated. Under carefully controlled conditions, excavation was continued to approximately 72 inches below grade, until the 4-inch radioactive pipe was uncovered. Water was seen to be seeping from around the pipe. As soil was removed from around the pipe, a puddle of approximately 3 gallons of radioactively contaminated water formed in the hole around the pipe and it became evident from an approximate 1/2-inch offset shear in the pipe that the 4-inch pipe had broken. The edges of the sheared pipe are corroded, indicating that the break may have existed for some time. A survey of the soil was performed using a hand-held frisker and confirmed presence of 300,000 disintegrations per minute (dpm) of contamination in the removed soil. The piping had previously been excavated and inspected in 1997 and no pipe breaks were evident at that time.

The warm waste water in the pipe is normally pretreated water, i.e., cleaned up of most radioactive constituents from having been passed through mixed cation/anion resin beds in either the TRA-605 or ATR-670 Warm Waste Treatment facilities. The purpose of the TRA Warm Waste Piping Replacement (30-inch) project was to replace this and other adjacent 40-year-old sections of pipe.

The source water to the 4-inch pipe was stopped by turning off the pumps to the Effluent Radiation Monitor (ERM) system. Seepage from the pipe stopped. A fiberglass patch is to be installed over the break in the 4-inch pipe as an added precaution that there will be no further leakage from the pipe. Surveillance sampling of the ATR warm waste effluent was established at eight intervals to ensure the water being routed to the TRA Evaporation Ponds does not exceed release criteria for the ponds. This sampling is being performed in accordance with approved procedures, and will be continued until the ERM system can be restored to service.

It is not currently known how long or how much leakage occurred from the pipe. A worst case scenario shows that no radioactive isotope limits would have exceeded 24 hour release limits. There is a possibility that this leakage could be outside Waste Water Land Application Permit requirements; a courtesy call to the State of Idaho is planned. DOE Order 5400.5, dated January 7, 1993, precludes new or increased discharge quantities and new soil columns. It has not yet been determined whether this pipe break is considered to be in violation of that DOE Order. As such, this event is being conservatively classified as an Unusual Occurrence.

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17. Operating Conditions of Facility at Time of Occurrence:

Soil excavation was in progress for the TRA Warm Waste Piping Replacement (30-inch) project

18. Activity Category:

03 - Normal Operations

19. Immediate Actions Taken and Results:

The source water to the 4-inch pipe was stopped by turning off the pumps to the Effluent Radiation Monitor (ERM) system which routes water through the pipe. Seepage from the pipe stopped. A fiberglass patch is to be installed over the break in the 4-inch pipe as an added precaution that there will be no further leakage from the pipe. Surveillance sampling of the ATR warm waste effluent was established at eight intervals to ensure the water being routed to the TRA Evaporation Ponds does not exceed release criteria for the ponds. This sampling is being performed in accordance with approved procedures, and will be continued until the ERM system can be restored to service.

20. Direct Cause:

21. Contributing Cause(s):

22. Root Cause:

23. Description of Cause:

24. Evaluation (by Facility Manager/Designee):

The excavation was carefully controlled and no personnel contamination or spread of contamination outside of posted contamination (CA) boundaries occurred. The potential for being outside Waste Water Land Application Permits is currently being investigated.

25. Is Further Evaluation Required?: Yes

If YES - Before Further Operation? No

By whom? Brad Swanson

By when? 11/06/2001

26. Corrective Actions:

27. Impact on Environment, Safety and Health:

28. Programmatic Impact:

29. Impact on Codes and Standards:

30. Lessons Learned:

31. Similar Occurrence Report Numbers:

32. User Field #1:

33. User Field #2:

NOTE TO FILE
Reference 2

System Identification: TRA-63
Note to File Author: Kathryn M. Jensen, North Wind, Inc.

Memo of Conversation

Date: August 20 and December 11, 2003
Person: Ed Dallago

Subject: TRA-605 Warm Waste Line (TRA-63)

Details

1. August 20, 2003:

Ed Dallago is part of the TRA Environmental Support group at TRA. During a tour of the TRA-63 site, he provided the information given herein.

- The warm waste line extends from the west portion of the south side of TRA-605. It was uncovered during the 30" warm waste piping replacement project in 2001.
- The area was excavated in 2001 to the south of TRA-605 for the 30" warm waste piping replacement project. Two leaks were identified during the project:

– The 4" warm waste line was uncovered on October 16, 2001, when it was found to be sheared and leaking.

– After the 4" line from ARMF was cut to cap the ends of the pipe, a small amount of liquid leaked from the pipe.

- The 4" warm waste line feeds into the 30" warm waste line, which extends to the evaporation pond.
- A work package was completed for the project by construction management and submitted to records management. Somewhere between the two, this work package was lost. Therefore, some of the information pertinent to the 30" warm waste piping replacement project is not available.
- Documentation relevant to the project is SPC-1503, A-E Construction Specification, Project File No. 021047, TRA Warm Waste Piping (30") Replacement, September 2001.

2. December 11, 2003:

Project Summary: In 1997 a 4-inch line that comes out of the south side of the TRA-605 Warm Waste Treatment Facility was driven over and partially broken away from the 30 inch line. In 2001 during replacement of the 30-inch line the break in the 4-inch line was discovered. CERCLA (conservatively) assumes that 9 to 13% of all waters through the 30 inch line during the 1997 to 2001 timeframe was lost to the soil column through the break amounting to 1 to 1.7 million gallons released to the soil column. At discovery RadCon took a soil sample for rad analysis but did not find rad above background soil levels. The location of the leak to the soil was identified as a CERCLA New Site Identification TRA-63.

NOTE TO FILE
Reference 2

The following are provided in response to questions posed during a phone conversation between K. Jensen and E. Dallago held on 12/11/03.

- How the 4 inch line was isolated / capped / put back into service?

  The break in the 4-inch line was repaired on 10/18/01 with an InduMar Products, Inc. "Stop-It", a water-activated polyurethane resin on fiberglass (aka GFE pipe wrap repair system). The 4-inch line from TRA-605 was replaced with a new line in May 2002.

- Is there any drawing/release/plume map or drawing?

  No. There is no plotted plume map or drawing for this specific release. However, CERCLA WAG 10 maintains a groundwater contamination database. The database can be used to generate drawings of known contamination plumes under the TRA facility.

- There was a small quantity of resin found at the release site.

  a. Is this typical of discharges to the TRA-715 Evaporation Pond?

     Yes, finding some resin in this discharge is typical. Due to the small size of the spherical beads some resin from the TRA-670 ATR Warm Waste Treatment Facility and the TRA-605 TRA Warm Waste Treatment Facility get flushed to the double-lined TRA-715 Evaporation Pond.

  b. What does the resin look like?

     Simply put the resin looks like plastic sand. According to the MSDS of ResinTech resin 95% of the spherical resin beads are in the minus 16 to plus 40 mesh range.

  c. Explain the ERM and diversion levels (100X or 1000X) to warm waste tank.

     The TRA-605 Effluent Radiation Monitor (ERM) System monitors the gross gamma radiation levels in the ATR and TRA warm waste streams. Based on the levels of radiation, the monitor will automatically select and energize applicable warm waste discharge pumps and route the effluent to applicable storage locations. The TRA-605 ERM System is designed to draw a continuous sample from the warm waste stream and passes a gamma-ray detection system using sodium-iodide (NaI) crystal detectors. Based on the level of radiation of cesium-137 (Cs-137) monitored the warm waste effluent is pumped to the TRA-715 Evaporation Pond, the 17,000 gallon TRA-605 Warm Waste Feed Tank (100X established setpoint) , or to the 100,000 gallon TRA-605 Hot Waste Storage Tank (1,000X established setpoint).

- It was reported that rad contamination at the release site was 300,000 dpm. Was the resin the source of radiological contamination at the release site or was it from released warm wastewater?

  The 300,000 disintegrations per minute (dpm) reading is a typical reading for resin, not from the water released from the soil. Analytical results from the soil sample taken at the time of the release discovery showed radiological concentrations typical of background soil..

- Was the 4 inch line under pressure?

  No.

TRA Historical Wastewater Release Summary

Introduction

This white paper is a compilation and summary of information that may indicate the presence of previously undocumented and/or inadequately characterized (from a RCRA perspective) historical releases from the TRA warm and hot waste systems. The TRA warm and hot waste systems are currently undergoing RCRA characterization and/or RCRA closure under VCO action plans 5.8.d and SITE-TANK-005. The identified potential releases discussed in this white paper are, in part, based on information sources that may be anecdotal (emails, personal communications, institutional lore, etc.), and the sources of this information must be kept in mind when assessing the veracity of the information. Conversely, given the age and materials of construction of much of the TRA warm and hot waste systems, the identified releases documented below may not bound the releases which may have occurred over the ~50 year operating life of the facility. It is not unreasonable to assume that the potential for release from these systems is relatively high for all associated direct buried piping, regardless of the availability of documentation of releases from the lines. Because the information below has been developed during characterization of VCO tank systems, the discussion for each potential historical release is organized by VCO tank system.

Piping Associated with the TRA-630 CTS Closure (VCO Action Plan 5.8.d)

1. 4" HDC-604B. This line was used from ~1955 to 1991 to transfer waste from the laboratories located in TRA-604 and, later, TRA-661 to the TRA-630 CTS. Prior to 1986, this line was routed to original catch tanks 3 and 4 and to tanks TRA-730-3 and -4 thereafter. The line was removed from service in 1991, at which time the laboratory waste was re-routed to the vent scrubber sump drain. The Facility Change Form (FCF 8.9.2-4) for this 1991 upgrade (EG&G 1991) notes: "*The existing carbon steel drainline* [buried line register (NRTS 1971) notes this line as being constructed of Duriron] *is old and has been leaking warm waste. The wall thickness has been measured and is extremely thin. The drainline must be re-routed to allow the use of the warm sinks in the labs to be resumed.*" See Figure 1 for a map showing the location of this potential release.

   It appears that problems were evident with this line as early as 1985. The field logbook for the TRA CTS upgrade project (Ca-Jun 1985) notes that at least a portion of this line was unearthed to perform repairs on the line. Pertinent entries are as follows:

   - "*Note: This ½ day digging was for the hot waste line to 604. A leak in this line needs repair. Two boxes of dirt.*" [7-22-85]
   - "*This crew continues to excavate for the 4" hot waste line to 604 lab drain. One box of contaminated soil today.*" [7-24-85]
   - "*Ca-Jun* [CTS Upgrade Project subcontractor] *has excavated the lab drain piping. Atlas* [CTS Upgrade Project subcontractor] *fitter here to plug* [assume that this means to repair or plug a hole in the line, not to plug the

line itself, as the line was to be returned to service] *this cast iron 4" line. However he did not have the correct material and had to go get it."* [7-26-85]

- *"Atlas fitter here this A.M. to install a test plug in lab drain line. This plug to be used until metal cap is available. Note: This fitter was unable to install plug because of hot waste liquid in the line."* [7-29-85]
- *"Atlas crew here this A.M. to continue plugging lab drain. 4" line was pumped of liquid however there is sludge in the line. Rainy weather also slows progress."* [7-31-85]
- *"Atlas crew has installed plug in the lab drain: however mud and moisture in the bottom of the hole will be inspected to determine if another leak is present."* [8-1-85]
- *"Atlas in (P.M.) working on lab drain leak (1/2 day on change work)."* [8-16-85]
- *"Atlas fitter here this A.M. to begin the fix on the 4" lab drain. The existing saddle tee is leaking. A pup*[?] *piece of plastic has been installed where the saddle was cut out. A piece of duriron pipe will be brought out when available."* [8-19-85].

There are additional entries in the logbook related to repair of a leaking warm waste line, but all subsequent entries appear to be related to a different pipe. There is no further mention in the logbook of the 4" lab drainline.

It should also be noted that there are two change orders associated with the CTS upgrade project that may specifically relate to this lab drain.

- A letter documenting Change Order #2 to project S-3075 [the CTS upgrade project] (MKC, Inc. 1985) states: *"Cut and cap the 4" diameter effluent liquid waste line which comes from the wing lab hot drains as soon as they are exposed. Reference Drawing No. 165935 P-1."* This letter is dated 7/23/1985. This letter, within the framework of the logbook entries, would appear to indicate that the intent for excavation of the line was to indeed to plug it with the intent of abandoning it. It is unclear how the laboratory warm waste been managed had they completed this isolation.
- A handwritten construction interface document (CID) (DOE-ID 1985) states: *"The subcontractor shall remove and replace the existing warm waste line which runs from the TRA-604 basement to the catch tank pump pit. The line shall be cut into 7 ft. lengths and placed in hot waste (which shall be provided by the government) boxes. The new line shall be 3" stainless steel. Lines shall run through the walls of the basement and pump pit and have reducer fittings provided to tie back into the existing system."* This CID was signed on 8/19/85 by both TRA project management and the subcontractor. It appears the work was to have been completed. FCF 8.9.2-4 and the diversion of the lab waste to the vent scrubber sump appears to indicate the line was, in fact, never replaced.

It appears based on the above information that during the CTS upgrade project, much work was completed or attempted to correct deficiencies with this drainline. Soil was excavated and removed, portions of the line were unearthed, at different times throughout the summer, the intent appears to have been to cap and abandon the line, then to replace the line. The best available information (the logbook) indicates the line was repaired and placed back into service until 1991, at which time, per FCF 8.9.2-4, it was cut in the basement of TRA-604, and the direct buried portion abandoned.

Facility personnel interviewed concerning this line and the associated soil all maintain that the work discussed above (soil removal, line repair) was conducted under the FFA/CO and is addressed in the OU 2-13 ROD (DOE-ID 1999). In fact, the timing of the work (1985) would actually have indicated that the site may have been listed on the COCA [The COCA appears to have been signed in 1987 and was superceded by the FFA/CO in 1991, thus this work predates even the COCA]. The FFA/CO was signed in 1991. Whether the line and soil were addressed under the COCA is currently unknown. This site, which is located northwest of the TRA-630 pump vault is not currently listed in the OU 2-13 ROD. The only currently identified FFA/CO site in the CTS courtyard is TRA-19, which is located immediately east of TRA-730. There is no information available as to sampling, analysis, and characterization of the soil (whether removed or left in place) or how much residual contamination remained in place at the conclusion of the work described above.

2. 4" HDC-632. This line was used from ~1955 to 1997 to convey radioactive wastewater from the hot cell building (TRA-632) to the TRA-630 CTS. Prior to 1981, this line was configured to discharge to original catch tanks 3 and 4. In 1981, the MTR reactor drain tank was reconfigured to discharge to a CTS discharge line (4" WDA-630A) and 4" HDC-632 was connected to original catch tanks 1 and 2. After 1981, 4" HDC-632 was the sole waste source to tanks 1 and 2 until 1986, at which time the tanks were replaced. Waste from TRA-632 via line 4" HDC-632 was the sole input to TRA-730-1 and –2 from 1986 until 1997. Evidence of a release from this line is strictly anecdotal:

    - The portion of this line that extends from the edge of the TRA-632 building to the TRA-630 vault is constructed of Duriron (NRTS 1971). The building drain collection piping network beneath TRA-632 is reported by facility engineering, based upon process knowledge and some remote video inspection as being stainless steel. There is purportedly a Duriron 'Y' piece immediately outside the north wall of TRA-632 at which the conversion from stainless steel (beneath the building) to Duriron (yard piping) was made. Common pipe fitting practices would have been to make this conversion using a mechanical joint or caulked joint. Such joints, particularly over a span of 50 years, are notorious for developing leaks.

- An email from Jennifer Quigley to Michael Wilcox and Janis Sherick dated 10/06/97 (Quigley 1997) states: *"From Aug 15, 1997 to Sept 14, 1997, Mac Isotopes discharged 70 gallons of effluent of which about 5 gallons arrived at the Catch Tanks. The only explanation I have for this is a leak. Even if Mac Isotopes are off by 50% on the estimates of discharge and there are losses due to liquid evaporated from the floor, these numbers do not make sense.*
  Discharges are:

8/25/97	*10 gallon*	*Co-60*	*Cell #1*
8/27/97	*10 gallon*	*Washdown*	*Cell #3*
9/2/97	*4 gallon*	*Gd*	*Cell #1*
9/3/97	*5 gallon*	*Gd*	*Cell #1*
9/4/97	*6 gallon*	*Gd*	*Cell #1*
9/4/97	*10 gallon*	*Washdown*	*Cell #3*
9/8/97	*5 gallon*	*Washdown*	*Cell #2*
9/9/97	*8 gallon*	*Co-60*	*Cell #1*
9/9/97	*5 gallon*	*Washdown*	*Cell #2*
9/10/97	*2 gallon*	*Co-60*	*Cell #1*
9/10/97	*5 gallon*	*Co-60*	*Cell #3*

  The numbers are good for July 15-Aug 14, 45 gallons discharged, 43 received. Bad for June 14 – July 14, 78 gallons discharged, 28 gallons received.
- An email from William Powell (TRA) to Steve Laflin (I4-MACI Hot Cell Manager) dated 10/08/97 (Powell 1997) states: *"Recent analysis of liquid discharge data to the catch tanks has indicated significant discrepancies between what MACI is reporting as discharged and what tank levels indicate. This has raised a question of the integrity of the drain line. While the most logical answer at this time has to do with the accuracy of the data being reported, good environmental stewardship requires that we establish definitively the reason for the discrepancy and assure ourselves of the integrity of the drainline. Several options are being explored to establish the integrity status of the drainline with good technical justification, however that will take a little time. In the interim, please do not discharge any liquids to the TRA catch tanks without my concurrence. We recognize that this curtails cell washdowns and we are working expeditiously to find a practical way to convince ourselves that there is not a problem with the integrity."*
- The drains in-cell were administratively controlled until 1999, at which time, the in-cell drains were grouted.

It is suspected that if there has been leakage from this line, it would have occurred in the area of the Duriron 'Y' fitting immediately north of TRA-632. Any leakage from this line would be in roughly the same area as the BCA, however, contaminated soils (if any) associated with this line are not currently addressed under the OU 2-13 ROD. See Figure 1 for a map showing the location of this potential release.

Hot waste system 7130

Piping Associated with VCO System TRA-004 (VCO Action Plan SITE-TANK-005)

1. 2" HDA-661. This stainless steel drainline was installed in 1959 or 1960 to transfer hot waste directly to the TRA-713 hot waste storage tanks. The line actively transferred hot waste from the time of its installation until 1996. The release and corrective action taken for this leaking line is documented in Interoffice Correspondence from A.V. Briscoe to D.E. Sheldon, dated 7/28/1986 (Briscoe 1986). This memo also references Unusual Occurrence Report (UOR) EGG-86-13. See Figure 1 for a map showing the location of the potential release from this line. The line was discovered, during excavation for the TRA CTS upgrade project, to be leaking. Five boxes (320 ft^3) of contaminated soil were removed before deciding to repair the line. After completion of the installation of the TRA-730 tank vault, the line was repaired. An additional eleven boxes (704 ft^3) of contaminated soil were removed, and approximately sixty feet of the line were replaced. The highest levels of contamination were detected beneath a 45 degree elbow in the line immediately to the south of TRA-661 [Note: As shown on Figure 1, the location of the contamination is located beneath the TRA-661 extension, which was constructed after the activities described herein]. The soil was removed to 10' below grade. The soil at the bottom of the excavation was reading 10 mR/hr gamma radiation (as opposed to readings beneath the elbow of ~800 mR/hr). A G-M detector was used to determine that the contamination extended an additional 3 ft below the bottom of the excavation (13 ft bgs). This contamination was left in place. The pipe leak was determined to be a result of two factors: a weld flaw on the underside of the 45 degree elbow that was present since the installation of the line in 1959, and damage to the line from a backhoe during a firewater line replacement job in 1977, which placed further stress on the weld flaw. Approximately 15 ft of pipe was bent and there were marks on the underside of the line that indicated that there had been pulling on the line during the firewater line replacement project. The line was successfully repaired in 1986 and placed back into service until its use was administratively controlled after its last use on 9/15/96.

   It appears that corrective action related to this release taken in 1986 only evaluated soil contamination for radiological constituents and not for any HWMA/RCRA or chemical contaminants. The release is not addressed under the OU 2-13 ROD.

2. Line 3" HDA-630. This stainless steel line was a TRA-630 CTS hot waste discharge line, which was used from ~1955 to approximately 1996. The line was presumably damaged in 1978 during the installation of a new firewater line to the TRA-632 building. According to the applicable UOR (EGG-85-17; EG&G 1985a), the release was detected on 5/7/85. The elbow of the line south of TRA-635 was deformed, presumably by heavy equipment used during the firewater main installation in 1978. The leak is thought to have occurred later than 1978 as a result of freezing of liquid within the already damaged line. A specific release was documented as being from a transfer from the TRA-630 CTS to the 605

HWST on 5/21/85. The extent of contamination, as documented in the UOR, is shown on Figure 1. The line was repaired and placed back into service early in the summer of 1985. The release from the damaged elbow of line 3" HDA-630 south of TRA-635 is the source of contamination for the brass cap area (BCA) identified and discussed in the OU 2-13 ROD. During the 1985 UOR corrective action, the radiological contamination associated with the release was assessed using boreholes and a G-M detector. The resulting data was used as part of the OU 2-13 investigation to complete a risk assessment and specify a remedy in the OU 2-13 ROD [The BCA was not evaluated under CERCLA until the OU 2-13 RI/FS (DOE-ID 1997). No Track 1 or Track 2 documentation is available]. The BCA investigation was limited to radionuclide data collected in 1985 as part of the UOR corrective action. No HWMA/RCRA contaminants were assessed as part of the UOR corrective action, and, consequently, were not evaluated in the OU 2-13 RI/FS. Residual cancer risk was calculated on the order of 1 (significantly higher than the regulatory limit of 10^{-4} to 10^{-6}) primarily due to the presence of high ^{137}Cs contamination in the soil. The OU 2-13 ROD specifies institutional controls (the concrete cover and brass cap marker) as the selected remedial alternative. The OU 2-13 ROD further specifies a contingent selected remedial activity, soil removal, should site conditions change and result in required removal of the soil. The OU 2-13 ROD specifies that, should soil removal be required, a hazardous waste determination will be required for the soil due to the presence of potentially hazardous waste in the TRA-630 CTS, the source of the release.

A second UOR, EGG-85-41 (EG&G 1985b), describes an event that took place late in the summer of 1985, which caused further spread of the contamination described in UOR-EGG-85-17. Apparently, during the repair of the elbow of line 3" HDA-630 south of TRA-635, the thrust block for the firewater line (the installation of which was the cause of the damage to 3" HDA-630) was moved. Upon pressurization of the firewater line, the firewater line in the immediate area of the soil contamination associated with the leaking elbow leaked a significant volume of water. The water mobilized the associated contamination and flowed east, beyond the retention basin and the road to the east of the basin. The resulting surficial contamination was reportedly removed and the entire roadway extending east from TRA-635 to beyond the retention basin was covered in blacktop. This secondary release of the contamination to the east of the defined BCA was not specifically addressed under the OU 2-13 ROD.

hand drawn map in UOR

Cont. removed to some extent road black topped

Finally, the OU 2-13 ROD describes the BCA as being a release from both a warm and a hot waste line; however, the UOR-EGG-85-17 only describes a release from line 3" HDA-630. The repair work for the damaged firewater line that resulted in the spread of contamination documented in UOR-EGG-85-41 appears to have been completed by the same subcontractors (Ca-Jun Construction and Atlas Mechanical) that were, at the time, completing the installation of the TRA-730 tank vault. Entries in the field logbook for the CTS upgrade project (Ca-Jun 1985) further indicate that a second line south of TRA-635, a 4" warm

cores taken as part of corrective action to the UOR not CERCLA investigation

waste line, was leaking. Further discussion for this second potential leaking line is provided under the discussion for system TRA-011 (Lines 4" WDA-630A and/or –630B), below.

Piping Associated with VCO System TRA-009 (VCO Action Plan SITE-TANK-005)

1. 4" WDC-641. This line was originally constructed (of Duriron) to provide a flow path for radiologically-contaminated canal water from the Gamma Building (TRA-641) to the retention basin. The line, along with the Gamma Building, was constructed in approximately 1955. The line was connected, at its downstream end, to line 4" WDA-630A, adjacent to the TRA-630 pump vault. While the Gamma Building was in operation, contaminated canal water would have been pumped via line 4" WDC-641 into line 4" WDA-630A, and would ultimately have flowed to the retention basin. The Gamma Building was taken out of service for its original purpose in approximately 1970, and the canal was drained at this time. There have been no sources of water to the line from the upstream end of the line after the draining of the canal. The junction of lines 4" WDA-630A and 4" WDC-641 is located east of the TRA-630 pump vault beneath what is now the bunkhouse trailer that is currently located between TRA-630 and TRA-635. The junction (which mates a Duriron line to a stainless steel line) is noted on a construction drawing (INEEL Reference Drawing 110609) as being a "mechanical joint." The construction detail shows that there is an elevation drop of approximately eight inches from line 4" WDC-641 to line 4" WDA-630A. Engineering calculations demonstrate that it is likely that each time the catch tanks were pumped to the retention basin via line 4" WDA-630A that the wastewater would have also back-flowed towards TRA-641 via line 4" WDC-641. Engineering calculations to confirm that the backflow would have occurred are limited, however, by the current lack of elevation data for line 4" WDA-630A from the junction with line 4" WDC-641 to the retention basin. The fact that liquid has been detected in the line, as late as 1984, appears to support the theory of backflow of CTS waste. Line 4" WDA-630A was cut and capped in approximately 1984 in two locations, in TRA-635 and TRA-630, effectively isolating line 4" WDC-641 on the downstream end. There are three documented or potential release events/locations (as shown on Figure 1) associated with line 4" WDC-641:
    - Leakage from line 4" WDC-641 is the suspected source of the "hot tree site" (HTS) described in the OU 2-13 ROD. The HTS is located at approximately the location of an elbow in line 4" WDC-641 as it turns east towards the TRA-630 CTS courtyard. The source of the wastewater which may have resulted in the "hot tree" is either historical discharges from the Gamma Building, which would have occurred prior to 1970, or CTS backflow, which could have potentially occurred until as late as approximately 1984. The HTS is documented as a "no further action" site in the OU 2-13 ROD, due to the relatively low levels of radiological contamination associated with the site. No analyses for HWMA/RCRA-regulated constituents were performed as part of the investigation of the HTS.
    - The documentation for FFA/CO site TRA-19 identifies 4" WDC-641 as the source of this release. During excavation to remove the original catch tanks and install the new TRA-730 tank vault, this line was breached by a

backhoe. It was reported that radioactive wastewater, which had apparently been standing in the line, sprayed from the breach, contaminating at least one worker and the surrounding soil. This release is identified as the source of FFA/CO site TRA-19. The soil contaminated as a result of this release was removed during subsequent excavation to install the vault. The OU 2-13 ROD specifies, however, that residual risk at the site, due to radiological contamination, requires that institutional controls be implemented similar to the BCA. It appears that data generated during the 1985 CTS upgrade project was used to complete the risk assessment for this site, which indicated institutional controls as necessary. It is unclear where the residual contamination evaluated in the OU 2-13 RI/FS originated, however, as the soil contaminated from the breached line was reportedly removed. Site TRA-19 was evaluated only for radionuclides, and no sampling and analysis for HWMA/RCRA-regulated constituents was completed at this site. As with the BCA, the OU 2-13 ROD provides for a contingent, soil removal remedy, which further specifies that a HWMA/RCRA hazardous waste determination for the soil will be required upon removal based on the presence of HWMA/RCRA-hazardous waste in the TRA-630 CTS. The presence of standing radioactive wastewater in line 4" WDC-641 in 1985 at the time it was breached indicates that the theory of backflow of CTS waste through the line is valid, as there are no other potential sources of liquid to the line. The fact that the soil contaminated as a result of the specific release discussed in the ROD was reportedly removed indicates that there is most likely another leak in the area east of the current TRA-730 tank vault

- The most likely potential release point in the area east of TRA-630 and -730 is the previously described mechanical joint located beneath the existing bunkhouse trailer connecting lines 4" WDC-641 and 4" WDA-630A. Based on the fact that these joints are notorious for leaking and the fact that the joint may have been subject to routine management of standing wastewater from 1955 to 1984 would indicate that it has a high potential for having released and possibly being the source of residual contamination identified as part of FFA/CO site TRA-19.

Piping Associated with VCO System TRA-011 (VCO Action Plan SITE-TANK-005)

1. 4" WDC-605. This line 4" Duriron line was in service as a treated water effluent line from the TRA-605 warm waste treatment facility from approximately 1984 to the summer of 2002, at which time it was isolated on both the upstream and downstream ends during the 30" line upgrade project. This line was discovered to have been leaking when the surrounding area was excavated during installation of the 10" FRP line (which replaced the existing 30" line) during the summer of 2002. This release, which is located immediately south of and adjacent to TRA-605 (see Figure 2 for a map showing the location of this release) has been identified as New Site TRA-63. The new site identification for this release was submitted for approval to EPA and IDEQ on June 6, 2002 (DOE-ID 2002).
2. 1 and 18" WDB-706. These lines served as warm waste drains from the TRA-706 working reservoir from ~1955 to 1970, at which time the MTR was inactivated. The 1" line served as a sump discharge line from the pipe pit beneath the reservoir and the 18" line served as a working reservoir overflow. The working reservoir, due to high radiation levels, was knocked over and removed in approximately 1975. The wastewater piping was abandoned in place at this time. The Working Reservoir Removal Report (INEL 1975) documents that historical releases occurred from piping associated with the working reservoir and that the soil associated with the site is contaminated. *"The area directly around the original OWR site was ribboned off since contamination does exist beneath ground level due to spills that occurred during operation of the MTR and existing contaminated piping that will be removed later as part of the overall MTR D&D effort. This ribboned area is contamination free at the ground surface with direct radiation levels of less than 0.5 mR/hr."* A walk down of the former location of the working reservoir indicates that the site is posted as a radiological contamination area and the site does not appear to be listed in the OU 2-13 ROD. The location of the contaminated soil area is shown on Figure 2.
3. Line 4" WDA-630A and or –630B. These stainless steel TRA-630 CTS discharge lines were installed in approximately 1955 to transfer catch tank waste to either the retention basin inlet or outlet. The lines were both cut and capped in TRA-635 in ~1984, but remain connected on the downstream end. Either of the two lines may have contributed to the release known in the FFA/CO documentation and the OU 2-13 ROD as the brass cap area. The OU 2-13 ROD indicates that the BCA release was from both a warm and hot drainline located south of TRA-635. The UOR (EG&G 1985a) upon which the release documentation is based, describes only a release from line 3" HDA-630. However, further evidence exists that a 4" warm line south of TRA-635, in the BCA, may have contributed to the BCA release. The CTS upgrade subcontractors (CaJun Construction and Atlas Mechanical) were presumably tasked with fixing the firewater line break that is identified in UOR-EGG-85-46 (EG&G 1985b). Pertinent entries from the CTS upgrade project logbook (Ca-Jun 1985) are as follow:
    - *"Two fitters began work on rodding*[?] *the broken fire line south of 635: However there is now yet another 4" line that is leaking and causing soil*

to slough down on the fire line. These fitters were unable to work on fire line and they helped on drain" [8-21-85]

- *"Atlas fitter repairing drainline."* [9-17-85] [It is unclear if this is the drainline discussed on the 8-21-85 log entry or the TRA-604 laboratory drainline discussed in entries from 7-22-85 to 8-19-85]

Any release that may have occurred from these lines at this location would be included in the BCA FFA/CO site (see Figure 1).

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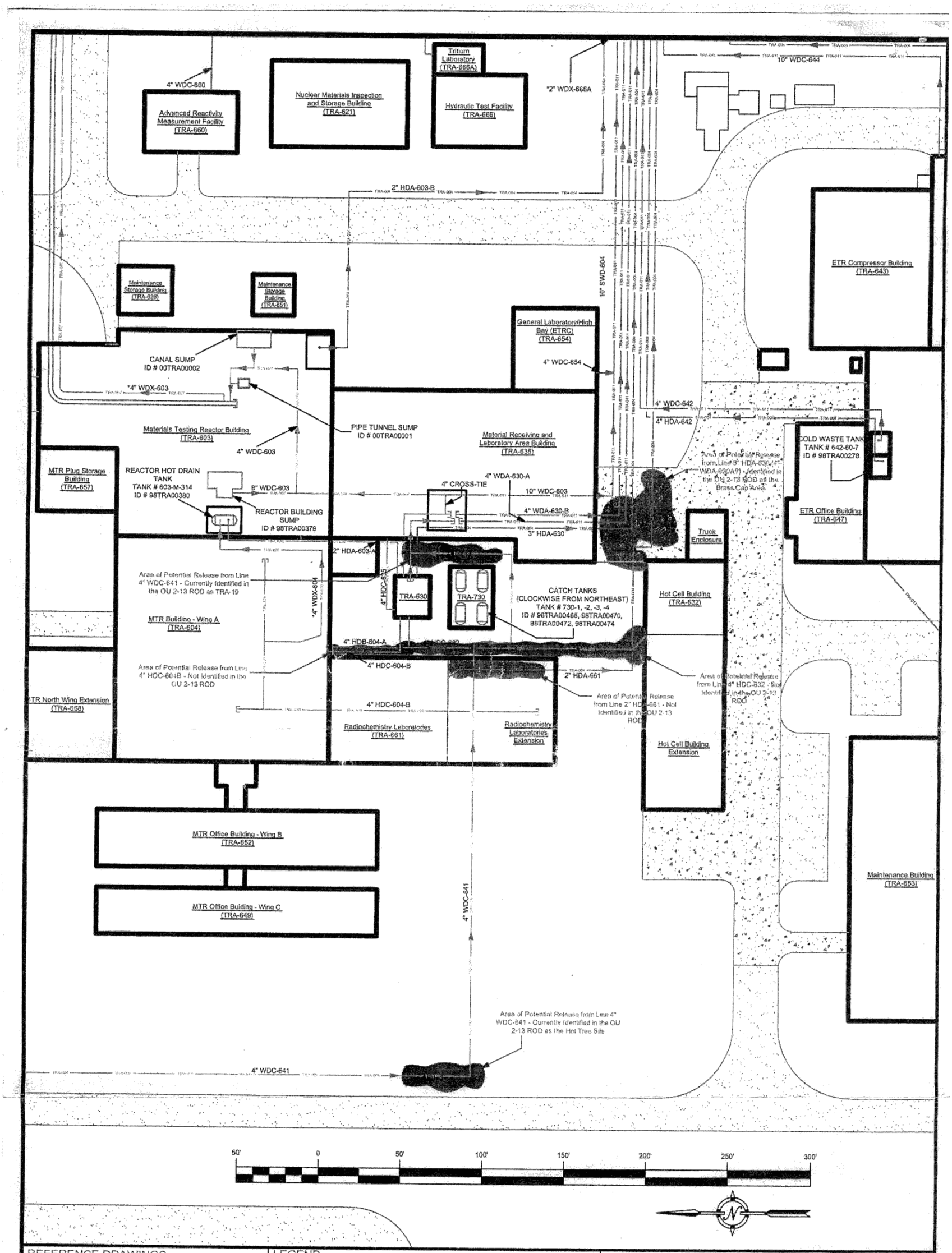
INEEL Reference Drawing 110609.



REFERENCE DRAWINGS
007428, REVISION 12
008851, REVISION 26

REFERENCE DOCUMENTS
NRTS 1971
ROLFE AND WILLS 1984

NOTES

LEGEND
- BUILDINGS
- TRA-630 CTS CLOSURE PIPING
- TRA-004 HOT WASTE PIPING
- TRA-007 WARM WASTE PIPING
- TRA-009 WARM WASTE PIPING
- TRA-011 WARM WASTE PIPING
- POTENTIAL RELEASE SITES

REVISIONS

REV	DESCRIPTION	DATE	INIT

VOLUNTARY CONSENT ORDER PROGRAM

THIS SCHEMATIC IS PROVIDED AS A SUPPLEMENT TO THE VOLUNTARY CONSENT ORDER PROGRAM'S SYSTEM IDENTIFICATION EFFORT. THIS SCHEMATIC IS NOT INTENDED TO BE USED AS A PIPING AND INSTRUMENTATION DIAGRAM NOR IS IT MANAGED BY INEEL CONFIGURATION CONTROL. THIS SCHEMATIC IS FOR VCO PROGRAM USE ONLY.

IDAHO NATIONAL ENGINEERING AND ENVIRONMENTAL LABORATORY
TEST REACTOR AREA (TRA)
RADIOACTIVE WASTEWATER HANDLING AND DISPOSAL SYSTEM
TRA WARM AND HOT WASTE SYSTEM POTENTIAL RELEASE SITES

FIGURE NUMBER:		REVISION:
FIGURE 1		0
SCALE: SHOWN	DATE: 03/03/03	RESEARCH: PORTAGE, INC.
		DRAWING: PORTAGE, INC.

441.45#
10/10/97
Rev. #03

RADIOLOGICAL SURVEY REPORT

BARCODE # 5308

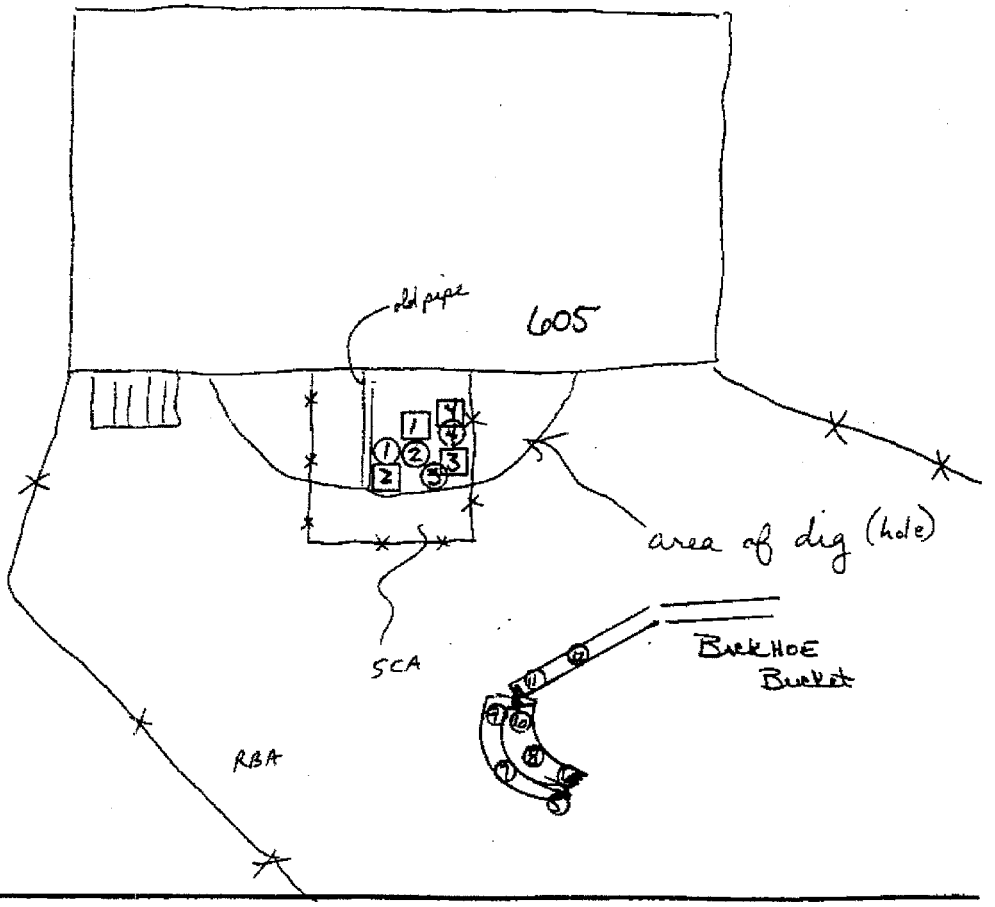
BLDG.: TRA 605
AREA/ROOM: North side of TRA 605
RWP #:
LOG #:
DATE: 10-9-01
TIME: 1100

☐ ROUTINE JOB DESCRIPTION
☒ NON ROUTINE (SPECIFY) ☐ FOLLOW UP
COMMENTS:
SPECIAL SURVEYS TAKEN DURING DIGGING OPS (WARM WASTE LINE)

RCT: Brian R. Chapple / B.R. Chapple
PRINT/SIGNATURE

REVIEWED BY:

Note: - SAMPLE OF DIRT PLACED IN SCALER WITH RESULTS <1000 dpm/sample B-γ & <20 dpm/sample α
- 500 ml squat jar sent to RML for analysis



441.45#
10/10/97
Rev. #03

RADIOLOGICAL SURVEY REPORT

COPY

SURVEY DATA AND LEGEND

ALL SWIPE, LARGE AREA WIPE (LAW), AND DIRECT SCAN SURVEY LOCATIONS ARE IDENTIFIED ON THE MAP. THOSE LOCATIONS WHERE ACTIVITY IS GREATER THAN OR EQUAL TO THE RADCON MANUAL (RCM) TABLE 2-2 LIMITS* ARE RECORDED BELOW.

INSTRUMENTS		
Type	Serial #	Efficiency
2A		10 %
		%
		%
Scaler	236835	33.1 %β
		24.2 %α
RSO50E		

SWIPE No.	LAW No.	DIRECT SCAN No.	LOCATION OR ITEM DESCRIPTION	SWIPE/SCAN (dpm/100cm²)		LAW (dpm)	
				βγ	α	βγ	α
*		*	RCM Table 2-2 limits used for this survey.	1000 / 5000	20 / N/A		
		1	Soil	10,000	N/A	—	—
		2	Soil	10,000	N/A	—	—
		3	Soil	30,000	N/A	—	—
		4	Soil	20,000	N/A	—	—

CA Contamination Area
HCA High Contamination Area
RA Radiation Area
HRA High Radiation Area
VHRA Very High Radiation Area
RMA Radioactive Material Area
ARA Airborne Radioactivity Area
RBA Radiological Buffer Area
FCA Fixed Contamination Area
SCA Soil Contamination Area
URMA Underground Radioactive Material Area
SOP Step-Off Pad

-x--x- Radiological Barrier

ALL dose rates are in mrem/hr, unless otherwise noted.

\# General Area Dose Rate
#@#(cm) Dose Rate at Distance From Source
*# Contact Dose Rate
#β / #γ Beta Corrected / Gamma Dose Rates
α Alpha
β Beta
γ Gamma
n Neutron

□ = Direct Scan
○ = Swipe (Smear)
L = Large Area Wipe (LAW)
△ = Air Sample
⌂ = Tritium Swipe

441.45#
10/10/97
Rev. #03

RADIOLOGICAL SURVEY REPORT

QUALITY RECORD

COPY

BARCODE # 5308

BLDG.: 605
AREA/ROOM: Warm Waste
RWP #: 31001577 01
LOG #: 17
DATE: 10/16/01
TIME: 1150

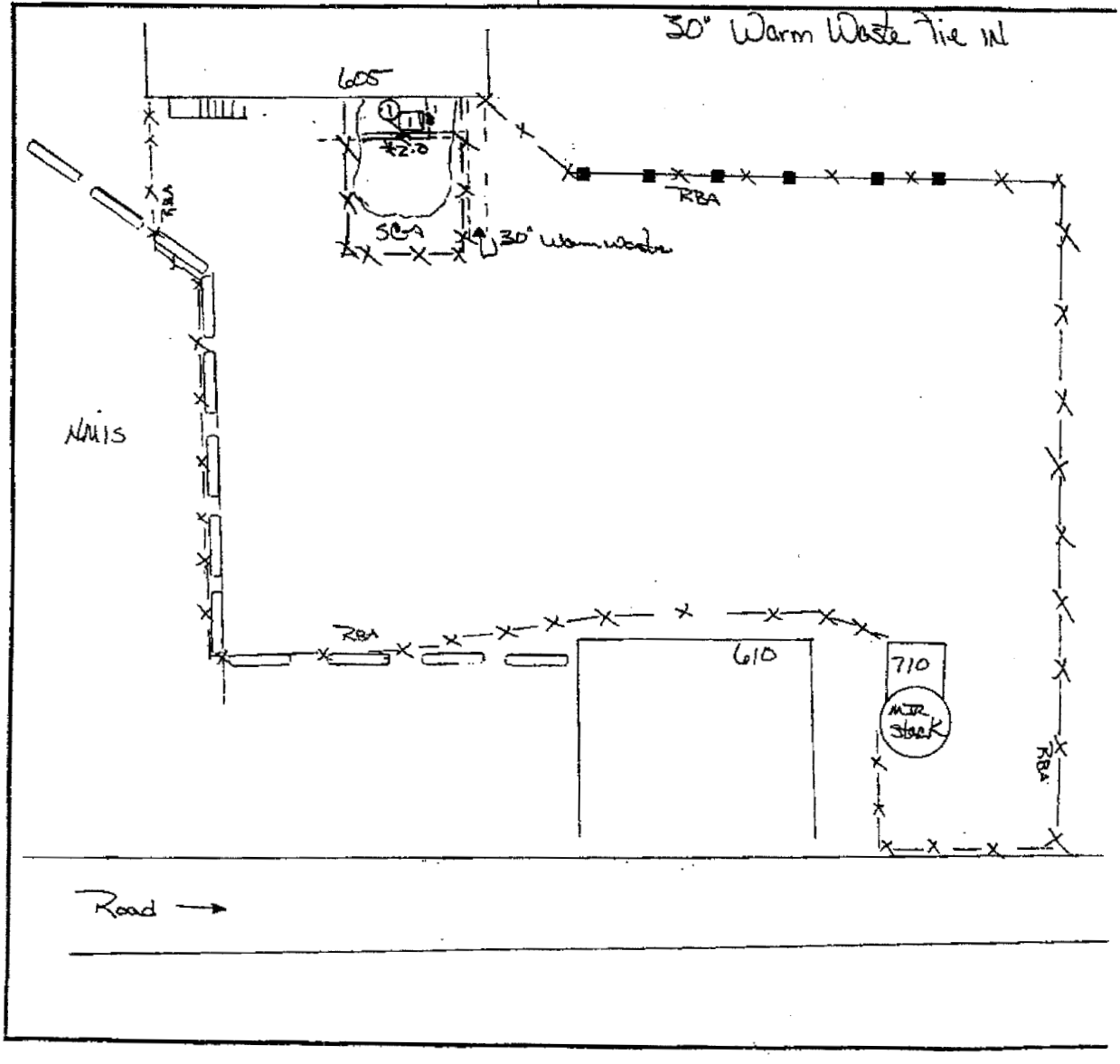
☐ ROUTINE
☒ NON ROUTINE (SPECIFY) ☐ FOLLOW UP

JOB DESCRIPTION

COMMENTS: Exposed Source of Leak
4" TR Pipe 5' from Building Foundation
Running East → West

RCT: Brian R Heppel / B.R. Heppel
PRINT/SIGNATURE

REVIEWED BY: D.J. Winston



441.45#
10/10/97
Rev. #03

RADIOLOGICAL SURVEY REPORT

INSTRUMENTS		
Type	Serial #	Efficiency
2"	501130	15 %
		%
		%
Scaler	236835	33.1 %βγ
		24.2 %α
450 SD	5001820	

SURVEY DATA AND LEGEND

ALL SWIPE, LARGE AREA WIPE (LAW), AND DIRECT SCAN SURVEY LOCATIONS ARE IDENTIFIED ON THE MAP. THOSE LOCATIONS WHERE ACTIVITY IS GREATER THAN OR EQUAL TO THE RADCON MANUAL (RCM) TABLE 2-2 LIMITS* ARE RECORDED BELOW.

SWIPE No.	LAW No.	DIRECT SCAN No.	LOCATION OR ITEM DESCRIPTION	SWIPE/SCAN (dpm/100cm²)		LAW (dpm)	
				βγ	α	βγ	α
*		*	RCM Table 2-2 limits used for this survey.	1000 / 5000	1		
		1	Soil	300,000	N/A	—	—

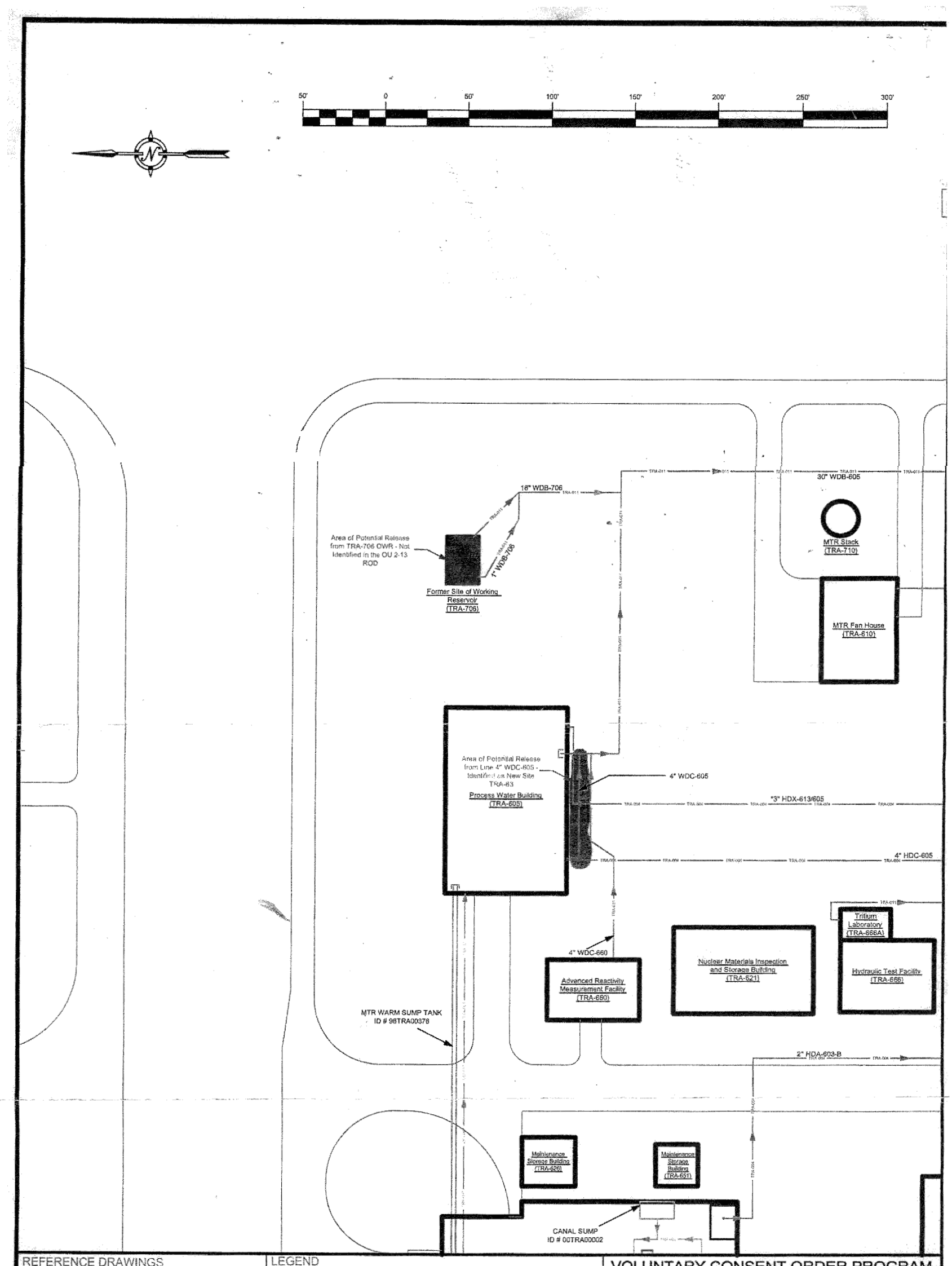
CA Contamination Area
HCA High Contamination Area
RA Radiation Area
HRA High Radiation Area
VHRA Very High Radiation Area
RMA Radioactive Material Area
ARA Airborne Radioactivity Area
RBA Radiological Buffer Area
FCA Fixed Contamination Area
SCA Soil Contamination Area
URMA Underground Radioactive Material Area
SOP Step-Off Pad

-x—x- Radiological Barrier

ALL dose rates are in mrem/hr, unless otherwise noted.

General Area Dose Rate
#@#(cm) Dose Rate at Distance From Source
*# Contact Dose Rate
#β / #γ Beta Corrected / Gamma Dose Rates
α Alpha
β Beta
γ Gamma
n Neutron

□ = Direct Scan
○ = Swipe (Smear)
L = Large Area Wipe (LAW)
△ = Air Sample
⌂ = Tritium Swipe



REFERENCE DRAWINGS
007428, REVISION 12
008851, REVISION 26

REFERENCE DOCUMENTS
NRTS 1971
ROLFE AND WILLS 1984

NOTES

LEGEND
- BUILDINGS
- TRA-630 CTS CLOSURE PIPING
- TRA-004 HOT WASTE PIPING
- TRA-007 WARM WASTE PIPING
- TRA-009 WARM WASTE PIPING
- TRA-011 WARM WASTE PIPING
- POTENTIAL RELEASE SITES

REVISIONS

REV	DESCRIPTION	DATE	INIT

VOLUNTARY CONSENT ORDER PROGRAM

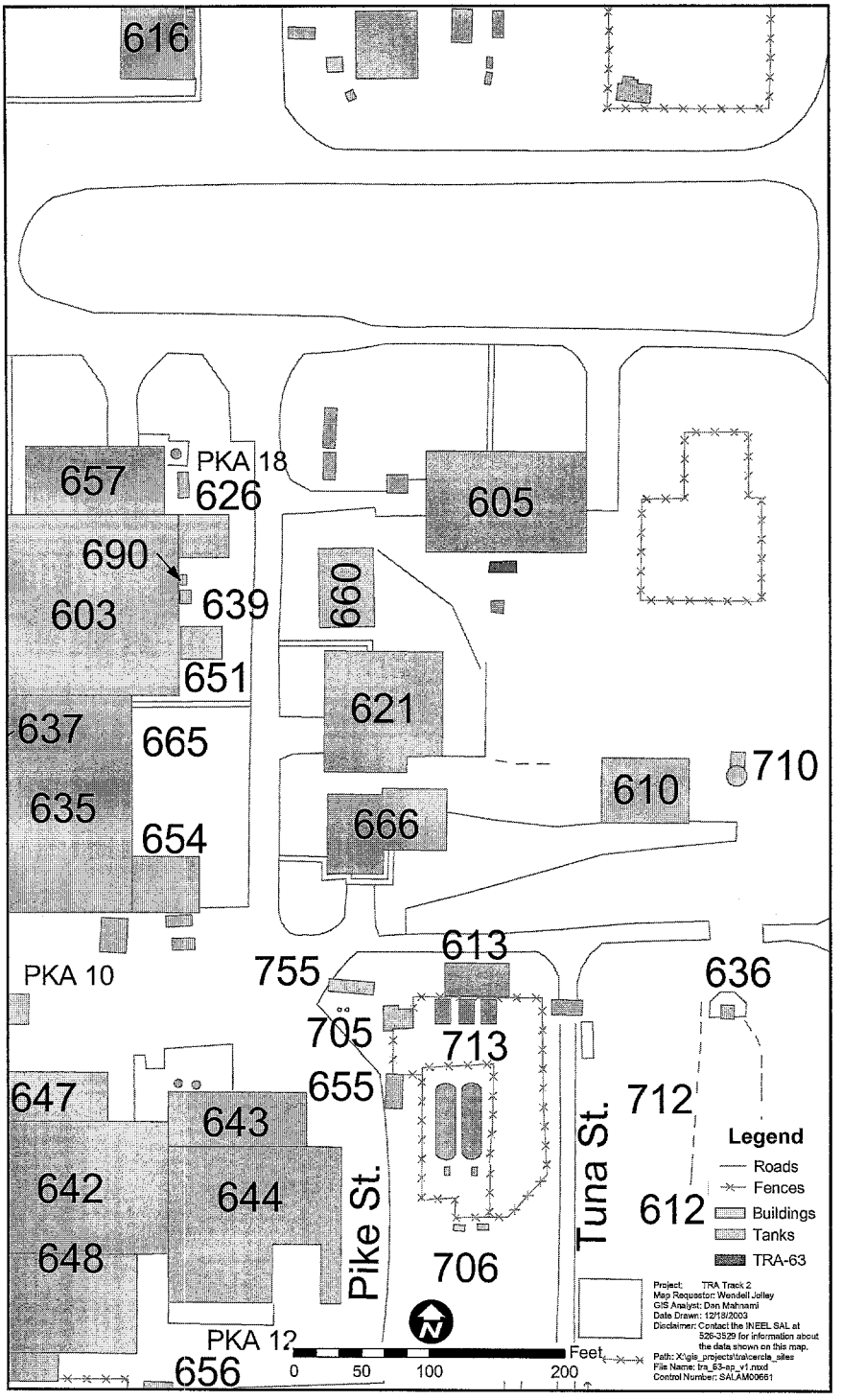
THIS SCHEMATIC IS PROVIDED AS A SUPPLEMENT TO THE VOLUNTARY CONSENT ORDER PROGRAM'S SYSTEM IDENTIFICATION EFFORT. THIS SCHEMATIC IS NOT INTENDED TO BE USED AS A PIPING AND INSTRUMENTATION DIAGRAM NOR IS IT MANAGED BY INEEL CONFIGURATION CONTROL. THIS SCHEMATIC IS FOR VCO PROGRAM USE ONLY.

IDAHO NATIONAL ENGINEERING AND ENVIRONMENTAL LABORATORY
TEST REACTOR AREA (TRA)
RADIOACTIVE WASTEWATER HANDLING AND DISPOSAL SYSTEM
TRA WARM AND HOT WASTE SYSTEM POTENTIAL RELEASE SITES

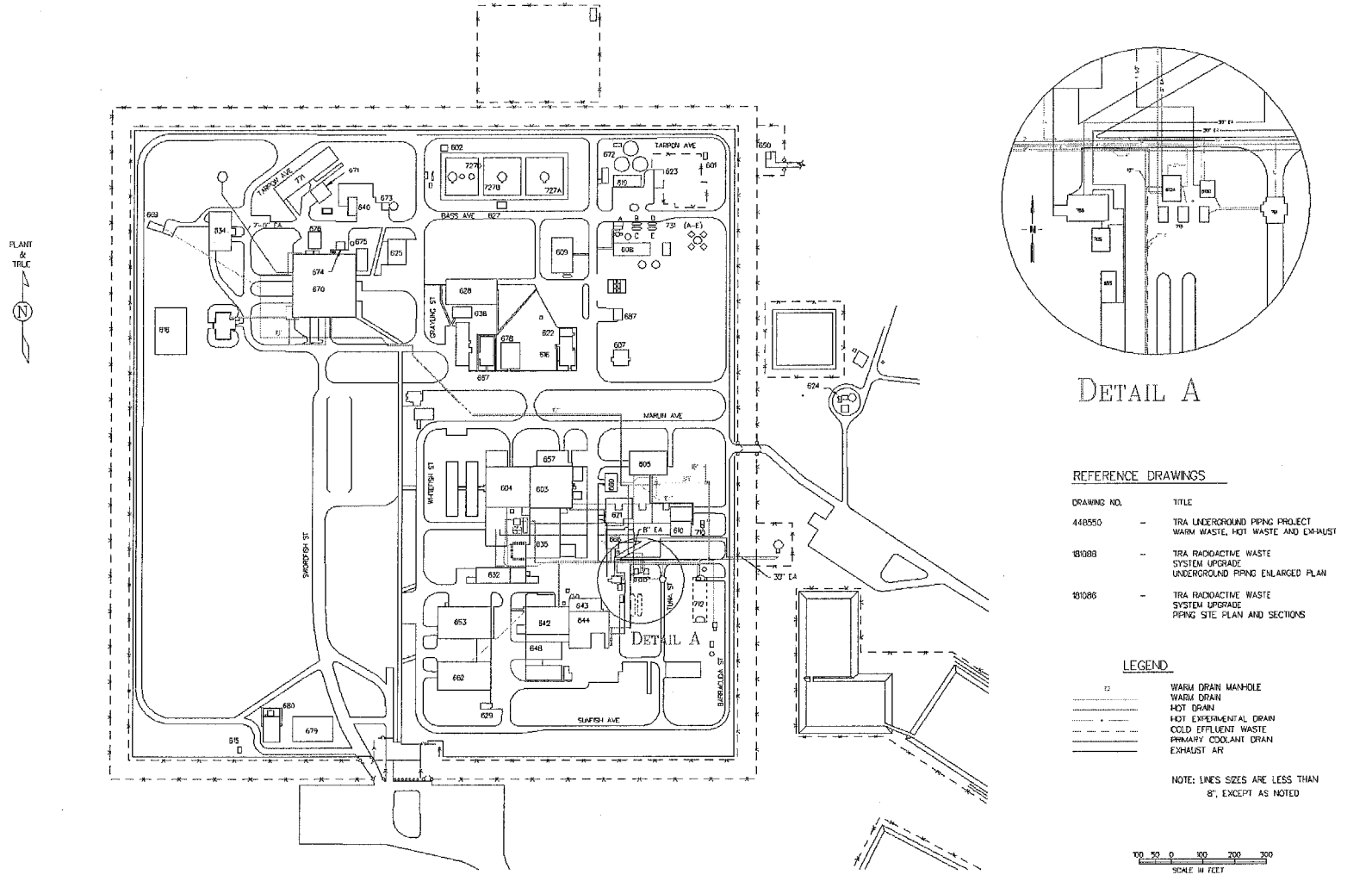
FIGURE NUMBER:	REVISION:
FIGURE 2	0

SCALE:	DATE:	
SHOWN	03/03/03	RESEARCH: PORTAGE, INC. DRAWING: PORTAGE, INC.

Reference 6



TRA Track 1 Map, TRA_63-ap-v1.mxd, Dan Mahnami, December 18, 2003 (Reference #24)



TRA Track 2 Map, Technical Site Information March 1998 (Reference #25)

FACT SHEET

Date: October 10, 2001

To: Distribution

From: B.J. Davis, Facility Representative
Test Reactor Area (TRA)

Subject: Soil Contamination Discovered During Excavation (Non-reportable)

SUMMARY:
At approximately 1100 on October 9, 2001, a Radiological Control Technician (RCT), who was providing radiological survey support in the form of direct scanning of removed soil for an excavation project, detected contamination in a backhoe bucket load of removed soil. The RCT performed the survey using a hand-held frisker and confirmed the presence of 30,000 dpm of contamination in the removed soil. The excavation was being performed in support of the new 30-inch warm waste line that is to be installed. The 30-inch line will replace the existing 30-inch warm waste line that allows flow of warm waste water from TRA-605, Warm Waste Treatment Facility, to the warm waste evaporation pond. The new trench is being excavated on the south side of TRA-605 to depth of approximately 5 feet below grade, and is approximately 10 feet to the west of the existing 30 inch warm waste line. Prior to this event, the trench had been excavated to a depth of 5 feet and a distance of 10 feet from the TRA-605 foundation, with no contamination being detected. The bucket of contaminated soil was removed from a depth of approximately 5 feet.

There is a 4 inch warm waste line that will cross the trench (east –to-west) once the trench is excavated an additional 1-2 feet to the south direction. The 4 inch line draws ATR warm waste water from the 10 inch dip tube, into the TRA-605 facility where it is circulated through a radiation monitor prior to discharging to the existing 30 inch warm waste line. Approximately 9,000 gallons or warm waste water flow through this line on a daily basis. The Contractor has not noted any discrepancy between the amount of ATR warm waste discharge volume and the volume of water being discharged to the warm waste evaporation pond.

There are no "sink holes" or other signs of underground water erosion in the area where the trench is being excavated. The excavated soil, and surrounding excavation site, is dry and there is no indication of moisture or dampness.

This same area was excavated in September 1997. The excavation was performed in order to assess the condition of the 30 inch warm waste line. No contamination was detected during this previous excavation. The Contractor is attempting to determine the exact depth of this previous excavation and is also attempting to retrieve any other information on this project from records storage.

With the information obtained to-date by the Contractor, this appears to be "historical" soil contamination and the source of the contamination cannot be exactly pinpointed.

INFORMATION ONLY

United States Government **Department of Energy**

memorandum

Idaho Operations Office

Date: July 3, 2001

Subject: 30" Warm Waste Line Replacement - (TPO-TRA-01-062)

Reference: J. C. Midgett letter to RV. Furstenau, Subject: Recommendation on a Warm Waste Piping (30") Alternative, CCN 23259, dated June 28, 2001

To: Robert G. Lange, Associate Director
Nuclear Facilities Management
Office of Nuclear Energy, Science and Technology

In response to a DOE-ID request, BBWI provided a recommendation to replace the existing 30" Warm Waste piping with a buried single-wall HDPE pipe, reference, attached. DOE-ID has reviewed the recommendation, and after consultation with your staff, recommends an immediate start on a modified concept which includes a double-lined HDPE pipe with single point leak detection in place of the single-wall pipe, as discussed in the reference. This modification will add approximately $120K to the engineering cost estimate of $630K provided in the reference, for a Rough Order of Magnitude (ROM) total project cost estimated at $750K.

With your concurrence, I plan to direct BBWI to immediately commence work on the replacement project, and request that you provide supplemental funding in the amount of $540K for FY-01, and $280K for FY-02. If supplemental funding is not available for this fiscal year, I will direct BBWI to place the current Retention Basis Isolation (GPP) project on hold and to provide a Change Control for DOE approval to use the remaining funding from that project to fund the 30" Warm Waste Line Replacement project. Approximately $445K Capital and $135 K Operating is available this fiscal year, with $335K for FY-02.

BBWI has recently launched a construction management improvement initiative to try to make INEEL construction projects more cost efficient and competitive with commercial practice. With your concurrence to proceed with this project, I will direct BBWI to use all means available to reduce the cost of the project, and to expedite construction to complete this important project by the end of this calendar year.

While it is expected that the identified funding source(s) should be sufficient to cover the estimated cost of the new project, there is a risk that the eventual cost may be significantly greater than presently estimated, and that additional funding may be required to complete the project. In that event, there will not be sufficient funding within the current target for FY-02 NE Landlord budget to complete the required and essential work planned and fund the balance of this project. Major elements of FY-02 work may have to be eliminated, such as maintaining the TRA Hot Cells in Standby, or the potable water system upgrade project.

Please review the attached recommendation, and provide your concurrence, as soon as possible, to commence the warm waste line replacement project as described above. If you have any questions please call me at 533-4014.

for R. V. Furstenau, Director,
Test Reactor Area Division

Attachment

INFORMATION ONLY

INEEL
BECHTEL BWXT IDAHO, LLC

P.O. Box 1625
2525 North Fremont Ave.
Idaho Falls, Idaho 83415
(208) 526-0111

June 28, 2001

CCN 23259

R. V. Furstenau, Director
Test Reactor Area
U.S. Department of Energy
Idaho Operations Office
850 Energy Drive, MS 7135
Idaho Falls, ID 83401-1563

CONTRACT NO. DE-AC07-99ID13727 - RECOMMENDATION ON A WARM WASTE PIPING (30") ALTERNATIVE

References: R. V. Furstenau letter to D. M. Lucoff, Request for Recommendation on a Warm Waste Piping Alternative for TRA, TPO-TRA-01-054, June 13, 2001, CCN 22962

Dear Mr. Furstenau:

Your referenced letter requested the Bechtel BWXT Idaho, LLC (BBWI) to investigate, evaluate, and provide a recommended alternative method to transport Test Reactor Area (TRA) warm wastewater to the evaporation pond. The recommended approach would provide assurance of eliminating potential for a warm waste leak to the environment. Verbal communication with your staff clarified that this request was for the 30-inch warm waste piping between the Warm Waste Treatment Facility, TRA-605, and the Retention Basin Inlet, TRA-712. The various alternate methods were to include advantages and disadvantages, and a rough cost estimate and schedule.

BBWI recommends installing a new single-wall high-density polyethylene (HDPE) pipe to replace the existing 30-inch warm waste piping. Though installing a double wall pipe with a leak detection system would provide additional assurance against a leak to the environment. There is no regulatory requirement for a double-wall pipe containment system for the TRA Warm Waste System. The engineering cost estimate for single-wall HDPE is approximately $630 K and could potentially be accomplished within one year of appropriate funding identification and allocation.

TRA Plant Systems Engineering evaluated two potential methods to isolate the 30-inch warm waste piping. These included installing a new buried pipe and an above ground piping system. Another method to provide some assurance of eliminating a potential leak is to re-line the existing 30-inch piping. Additionally, performing visual inspections of selected portions of the buried warm waste piping was also evaluated.

Attached to this letter are discussion papers for each alternative evaluated. Each discussion paper includes a description, advantages and disadvantages, operational impacts, and engineering estimated schedules and costs.

R. V. Furstenau
June 28, 2001
CCN 23259

The cost estimate for all the alternatives are engineering estimates only. BBWI cost estimating has not been consulted nor tasked with developing a more detailed and accurate cost estimate. Additionally, a funding determination to identify the appropriate funding source has not yet been pursued. It is expected the BBWI Funding Determination Committee would determine the new buried piping alternative to be a construction activity, whereas the other alternatives would probably be operating funded activities. A potential source of funds to pursue any of the alternatives could be the Retention Basin GPP project that is scheduled for FY 2001 and FY 2002. About $445 K capital funds and $135 K operating funds remain from this project this fiscal year. There is $280 K capital funds and $55 K operating funds available next fiscal year.

None of these alternatives would remove the Retention Basis from service. However, the new buried piping alternative could be designed and installed such that the 30-inch piping re-routing portion of the Retention Basin project could be re-scoped or possibly eliminated. The warm waste piping of the Utility Upgrade project would also be re-scoped to eliminate the 30-inch piping replacement and material selection. None of the alternatives evaluated would eliminate other potential warm wastewater leaks to the environment from other buried warm waste piping. A new buried warm waste pipe would provide assurance that the potential for a significant tritium warm waste leak to the environment would be minimized since the majority (>98%) of this waste water is transported through the 30-inch piping to the Retention Basin Inlet.

Upon receipt of your concurrence to purse design and installation of a new buried warm waste piping or one of the other alternates, and allocation of appropriate funding, BBWI will expedite the project process. This project would be aggressively pursued on a compressed schedule using industry standard commercial practices.

I would be able to meet with you at your convenience to discuss the recommended path forward and to establish an appropriate PEMP criteria tied to this effort.

Sincerely,

J. C. Midgett, Director
Test Reactor Area

$445K CE $280K CE
$135K OP $55K OP
$580K FY-01 $335 FY-02
$335K FY-02
$915 total

DMC:db

Attachments

cc: R. J. Hoyles, DOE-ID, MS 1221
W. W. Gay III, MS 3906
H. W. Mumford III, MS 3670
L. A. Sehlke, MS 3810
E. L. Watkins, MS 3890

INSTALLATION OF NEW BURIED WARM WASTE DRAIN LINE

HISTORY

In October 1997, the area immediately south of TRA-605 MTR Process Water Building was excavated in order to perform non-destructive examination (NDE) of Warm Waste piping. NDE of the 30-inch Warm Waste drainpipe indicated general external surface corrosion and pitting. Radiographs performed on the excavated portion of pipe indicated extensive interior deposits, corrosion, and pitting. Although an accurate pipe wall thickness could not be determined utilizing NDE, an engineering evaluation estimated that the pitting was approaching half-wall thickness. Based on the results of the NDE, and the in-service time of 30 to 40 years, Engineering recommended replacement of the TRA Warm Waste System buried piping within the 5 years following April 1998. (EDF: TRA-ATR-1578)

DESCRIPTION

TRA Engineering recently investigated the feasibility of installing a new buried Warm Waste pipe, from TRA-605 to TRA-716 Evaporation Pond Pump Station, to perform the function of the existing deteriorating 30-inch pipe.

Installation of a single wall, (12-inch, 160 psi., HDPE), drainpipe is proposed which would require excavation from TRA-605 to TRA-716. The new drain line was assumed to tie in to the existing system immediately south of TRA-605. One 10-inch and two 4-inch warm drain lines immediately south of TRA-605 would be re-routed from the existing 30-inch drain line to the new pipe. The existing 30-inch buried drain line would be sealed and abandoned in place.

There are no environmental requirements to have double-containment piping for this low level contaminated piping system, therefore single wall HDPE pipe is proposed to provide resistance to degradation from corrosion and chemical attack. Single wall HDPE is a relatively cost-effective means of replacing existing degraded pipe. The existing piping from TRA-712 Retention Basin Inlet to TRA-716, as well as the piping from TRA-716 to the evaporation pond, is also single wall 12-inch HDPE. The new 12-inch HDPE pipe would tie into the existing 12-inch HDPE drain line between TRA-712 and TRA-716. Maintaining consistent material dimensions and type would facilitate easier and less expensive tie-in to existing piping.

This project would remove the 30-inch Warm Waste drain from service to the retention basin inlet. However, the remaining piping connected to the retention basin inlet will not be modified by this project and will remain in service. The retention basin inlet would remain in service and continue to overflow to TRA-716.

ADVANTAGES

Installation of a new drainpipe is a permanent solution to providing a Warm Waste drain with known integrity and extended service life. Additional benefits of replacement include:

1. Excavation for the new pipe can be performed in relatively clean soil areas, minimizing excavation costs as well as schedule impacts.
2. Installation of a new line would maintain current system design, therefore minimizing impacts to operations.
3. No procedure changes, operator re-training or major system redesign would be required.
4. The existing pumping station TRA-716 can be utilized.

INSTALLATION OF NEW BURIED WARM WASTE DRAIN LINE

5. A new buried drain line can facilitate future upgrades to the Warm Waste system, such as the currently planned TRA-712 Retention Basin Isolation Project and the Warm Waste portion of the Utility Upgrade Project.

DISADVANTAGES

Disadvantages of the proposed new drainpipe include:

1. Some uncertainty exists of congestion that could be encountered during excavation
2. Extensive excavations, including two access road disruptions and repair.
3. TRA-712 retention basin remains in service and supplied with Warm Waste drains from piping not affected by this project.

OPERATIONAL IMPACTS

The operational impact of this project would be realized during the actual tie-in of the new line to the existing system. While a large portion of the project can be completed prior to tie-in, the Warm Waste system would be out of service for a relatively short time during re-routing of the Warm Waste lines that feed into the existing buried drain line.

SCHEDULE & COSTS

See attached schedule and cost estimates which assume only minimal interference with other utility services, and no cleanliness issues occur, during the excavation phase of the project. The attached cost figures are rough estimates utilizing 12-inch single wall HDPE pipe.

The cost impacts of using alternate materials are provided below as additions to the estimated total project cost.

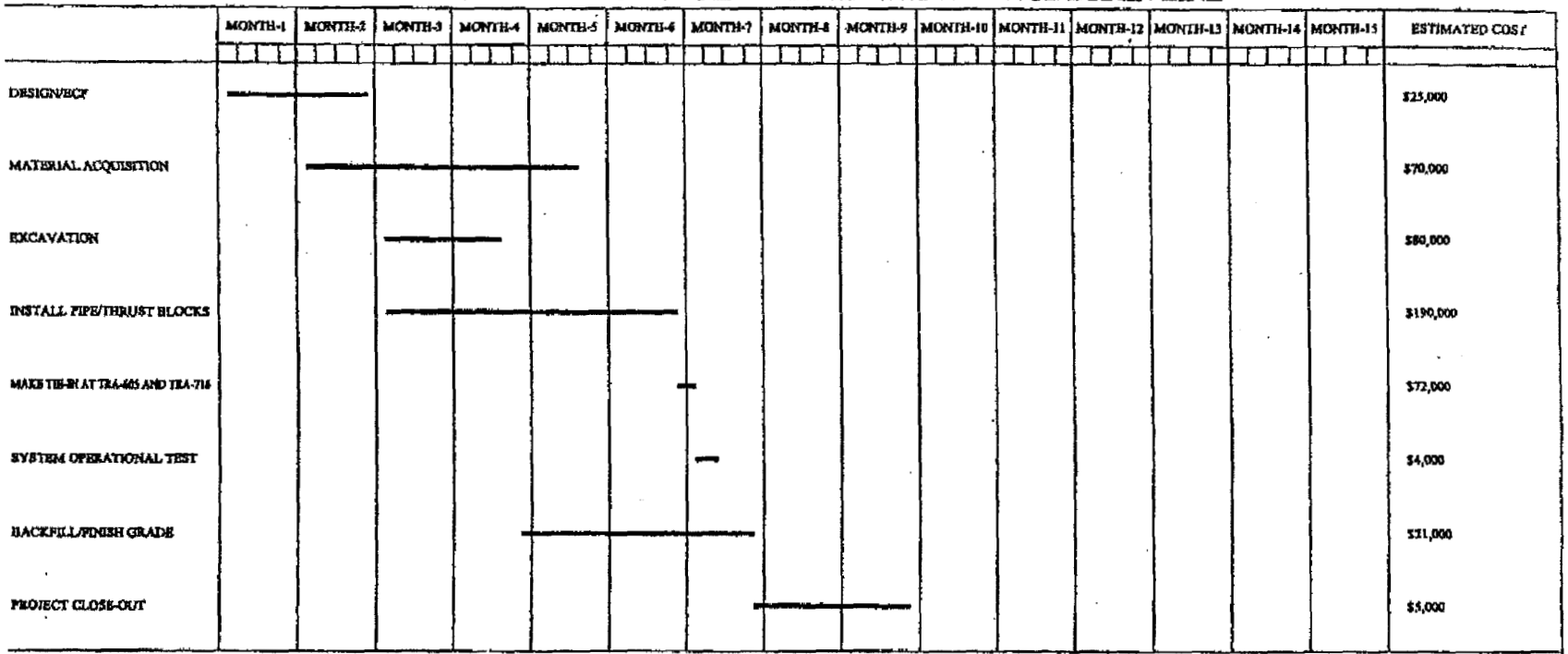
Double contained, 11-inch, 160 psi., HDPE pipe	+$ 75,000
Single wall, 12-inch, Sch. 40, 304L SST pipe	+$185,000
Double contained, 10-inch, Sch. 40, 304L SST pipe	+$395,000
Single point leak detection system	+$ 8,000

BBWI Cost Estimating has not been consulted for a preliminary detailed burdened cost estimate.

SUMMARY

While replacement of the existing Warm Waste line, with a new buried line, permanently deals with concern for the integrity of the existing pipe, this project would not address the known potential leakage point at TRA-712 Retention Basin identified in EDF TRA-ATR-1296. The retention basin inlet would remain in service fed by other piping not being affected by this project. Installation of a new warm drain line does not impact the TRA-712 Retention Basin Isolation project or the Warm Waste portion of the Utility Upgrade project, which would still need to be performed.

INSTALLATION OF NEW BURIED WARM WASTE DRAIN LINE



	MONTH-1	MONTH-2	MONTH-3	MONTH-4	MONTH-5	MONTH-6	MONTH-7	MONTH-8	MONTH-9	MONTH-10	MONTH-11	MONTH-12	MONTH-13	MONTH-14	MONTH-15	ESTIMATED COST
DESIGN/ECP																$25,000
MATERIAL ACQUISITION																$70,000
EXCAVATION																$80,000
INSTALL PIPE/THRUST BLOCKS																$190,000
MAKE TIE-IN AT TRA-605 AND TRA-716																$72,000
SYSTEM OPERATIONAL TEST																$4,000
BACKFILL/FINISH GRADE																$31,000
PROJECT CLOSE-OUT																$5,000
															SUBTOTAL	$467,000
															35% CONTINGENCY	
															ESTIMATED TOTAL COST	$630,000

INSITUFORM RE-LINE OF EXISTING WARM WASTE DRAIN LINE

HISTORY

In October 1997, the area immediately south of TRA-605 MTR Process Water Building was excavated in order to perform non-destructive examination (NDE) of Warm Waste piping. NDE of the 30-inch Warm Waste drainpipe indicated general external surface corrosion and pitting. Radiographs performed on the excavated portion of pipe indicated extensive interior deposits, corrosion, and pitting. Although an accurate pipe wall thickness could not be determined utilizing NDE, an engineering evaluation estimated that the pitting was approaching half-wall thickness. Based on the results of the NDE, and the in-service time of 30 to 40 years, Engineering recommended replacement of the TRA Warm Waste System buried piping within the 5 years following April 1998. (EDF: TRA-ATR-1578)

DESCRIPTION

TRA Engineering recently investigated the feasibility of performing an in-place re-line of the buried Warm Waste pipe, from TRA-605 to TRA-712 Warm Waste Retention Basin. The cleaning and re-line would be performed by an outside vendor, while excavation and pipe access points would be provided by the INEEL workforce.

Insituform Technologies provides a service to re-line the existing pipe with a heat-curable resin liner. Previously, this subcontractor performed re-lining of deteriorating cold waste lines at TRA. Insituform is familiar with the INEEL/DOE work environment and safety culture, having performed multiple jobs at NRF and Hanford.

ADVANTAGES

Installation of a resin liner in the existing drainpipe is a permanent solution to providing a Warm Waste drain with known integrity and extended service life. Additional benefits of re-lining include:

1. System configuration remains unchanged
2. No procedure changes, operator re-training or major system redesign would be required.

DISADVANTAGES

Disadvantages of the proposed drainpipe re-line are:

1. Excavate at both ends of pipe, and for access at various points along the pipe.
2. Sections of the pipe will need to be cut out to facilitate the re-line and then replaced.
3. Due to the uncertainty of the extent of internal pipe corrosion and fouling, the method and magnitude of internal pipe cleaning is unknown.
4. Operational impacts, as discussed below, could be extensive.

INSITUFORM RE-LINE OF EXISTING WARM WASTE DRAIN LINE

OPERATIONAL IMPACTS

The operational impact of this project would be taking the Warm Waste system out of service during excavation as well as the installation of the liner. Excavation and access to the pipe at the 90 deg. elbows would be required since there are no manholes or other access points along the length of the pipe. Liner installation and access point modifications could take approximately two to three months since it will have to be done in sections. A possible mitigation of the time required for modification is to install a temporary pumping system.

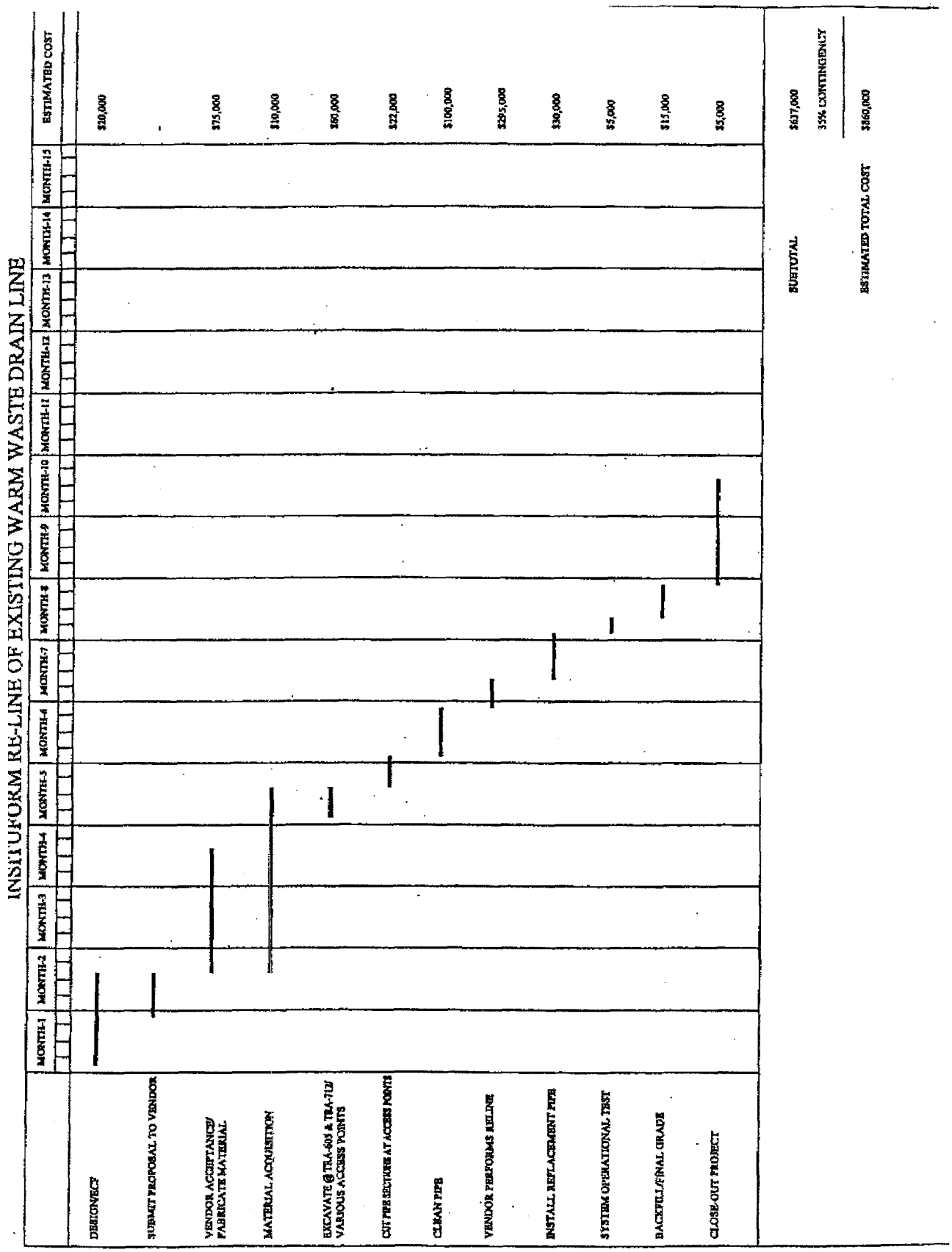
SCHEDULE & COST$

See attached schedule and cost estimates which assume only minimal interference with other utility services, and no cleanliness issues occur, during the excavation phase of the project or during pipe cleaning. Cost figures are rough estimates. BBWI Cost Estimating has not been consulted for a preliminary detailed burdened cost estimate.

SUMMARY

The Insituform representative, Greg Howells, confirmed that the scope of work for re-lining our Warm Waste line is well within their capabilities. However, Mr. Howells stated Insituform would have to be presented with a formal work scope in order to determine if the company would be willing to accept the liability of performing the environmental work at the INEEL.

While re-lining the existing Warm Waste line permanently deals with concern for the integrity of the existing pipe, this project would not address the known potential leakage point at TRA-712 identified in EDF TRA-ATR-1296. The retention basin inlet would remain in service fed by other piping not being affected by this upgrade. Re-lining the existing warm drain line does not impact the TRA-712 Retention Basin Isolation project, which would still need to be performed.


INSITUFORM RE-LINE OF EXISTING WARM WASTE DRAIN LINE
MONTH-1
MONTH-2
MONTH-3
MONTH-4
MONTH-5
MONTH-6
MONTH-7
MONTH-8
MONTH-9
MONTH-10
MONTH-11
MONTH-12
MONTH-13
MONTH-14
MONTH-15
ESTIMATED COST
DESIGN/ECP
$10,000
SUBMIT PROPOSAL TO VENDOR
-
VENDOR ACCEPTANCE/ FABRICATE MATERIAL
$75,000
MATERIAL ACQUISITION
$10,000
EXCAVATE @ TRA-603 & TRA-712/ VARIOUS ACCESS POINTS
$60,000
CUT PIPE SECTIONS AT ACCESS POINTS
$22,000
CLEAN PIPE
$100,000
VENDOR PERFORMS RELINE
$295,000
INSTALL REPLACEMENT PIPE
$30,000
SYSTEM OPERATIONAL TEST
$5,000
BACKFILL/FINAL GRADE
$15,000
CLOSE-OUT PROJECT
$5,000
SUBTOTAL
$637,000
35% CONTINGENCY
ESTIMATED TOTAL COST
$860,000

INSTALLATION OF ABOVE GRADE WARM WASTE DRAIN LINE

HISTORY

In October 1997, the area immediately south of TRA-605 MTR Process Water Building was excavated in order to perform non-destructive examination (NDE) of Warm Waste piping. NDE of the 30-inch Warm Waste drainpipe indicated general external surface corrosion and pitting. Radiographs performed on the excavated portion of pipe indicated extensive interior deposits, corrosion, and pitting. Although an accurate pipe wall thickness could not be determined utilizing NDE, an engineering evaluation estimated that the pitting was approaching half-wall thickness. Based on the results of the NDE, and the in-service time of 30 to 40 years, Engineering recommended replacement of the TRA Warm Waste System buried piping within the 5 years following April 1998. (EDF: TRA-ATR-1578)

DESCIPTION

TRA Engineering recently investigated the feasibility of installing a new Warm Waste pipe above grade, from TRA-605 to TRA-716 Evaporation Pond Pump Station, to perform the function of the existing deteriorating 30-inch pipe. Installation of an above grade drainpipe would require excavation at TRA-605 and at TRA-716. One 10-inch and two 4-inch warm drain lines immediately south of TRA-605 would be re-routed from the existing 30-inch drain line to a newly installed vault. A pumping station in the vault would pump Warm Waste to the above grade pipe and on to TRA-716. The existing 30-inch buried drain line would be abandoned in place.

A pumping station and vault would be buried on the south side of TRA-605 in close proximity to the existing piping. The pumping station would be comprised of redundant pumps and power supplies with a level control system. Above ground piping is proposed to be 11-inch HDPE double wall pipe installed on an extensive temporary support system. Freeze protection would be required during winter months. This system would consist of strategically positioned heating units that provide warm air circulation between the carrier and containment pipes. Leak detection is provided using drain lines placed along the pipe run which can be opened to check for leakage.

Installation of an above grade drainpipe is a temporary solution to providing a Warm Waste drain with known integrity. Remaining piping connected to the retention basin inlet will not be modified by this project. The retention basin would remain in service and will continue to overflow to TRA-716 until a permanent modification is performed.

ADVANTAGES

Benefits of an above grade piping system include:

1. Ease of monitoring pipe condition
2. Fabrication of the piping system can be completed prior to system tie-in, reducing operational impacts.
3. Minimal excavation required

DISADVANTAGES

Disadvantages to the proposed above grade drainpipe are as follows:

1. New pumping station and collection tank/vault would need to be installed requiring electrical power source redundancy.
2. Major design work including pipe supports which meet PC2 seismic requirements, power source redundancy, thermal expansion/contraction,

and electrical and mechanical controls.

3. An extensive freeze protection system would need to be installed, requiring more electrical power and controls interface.
4. Pipe is susceptible to external hazards such as harsh weather, mobile equipment, and vehicular damage.
5. Increased operator interfaces due to new and/or changed procedures, freeze protection, and coordination between ATR operations and Utility Area operations during pumping.
6. Some access road closures would be required, impacting emergency response.
7. Concerns for personnel safety due to changing radiation fields in the vicinity of the pipe. The history of Warm Waste piping projects at TRA indicates a potential for radiation fields of 10 R/hr on contact.

OPERATIONAL IMPACTS

Some operational impact of this project would be realized during the actual tie-in of the new line to the existing system. While a large portion of the project can be completed prior to tie-in, the Warm Waste system would be OOS during re-routing of the process lines that feed into the existing buried drain line. Further impacts to operations would be required during system operation, especially during cold weather.

SCHEDULE & COSTS

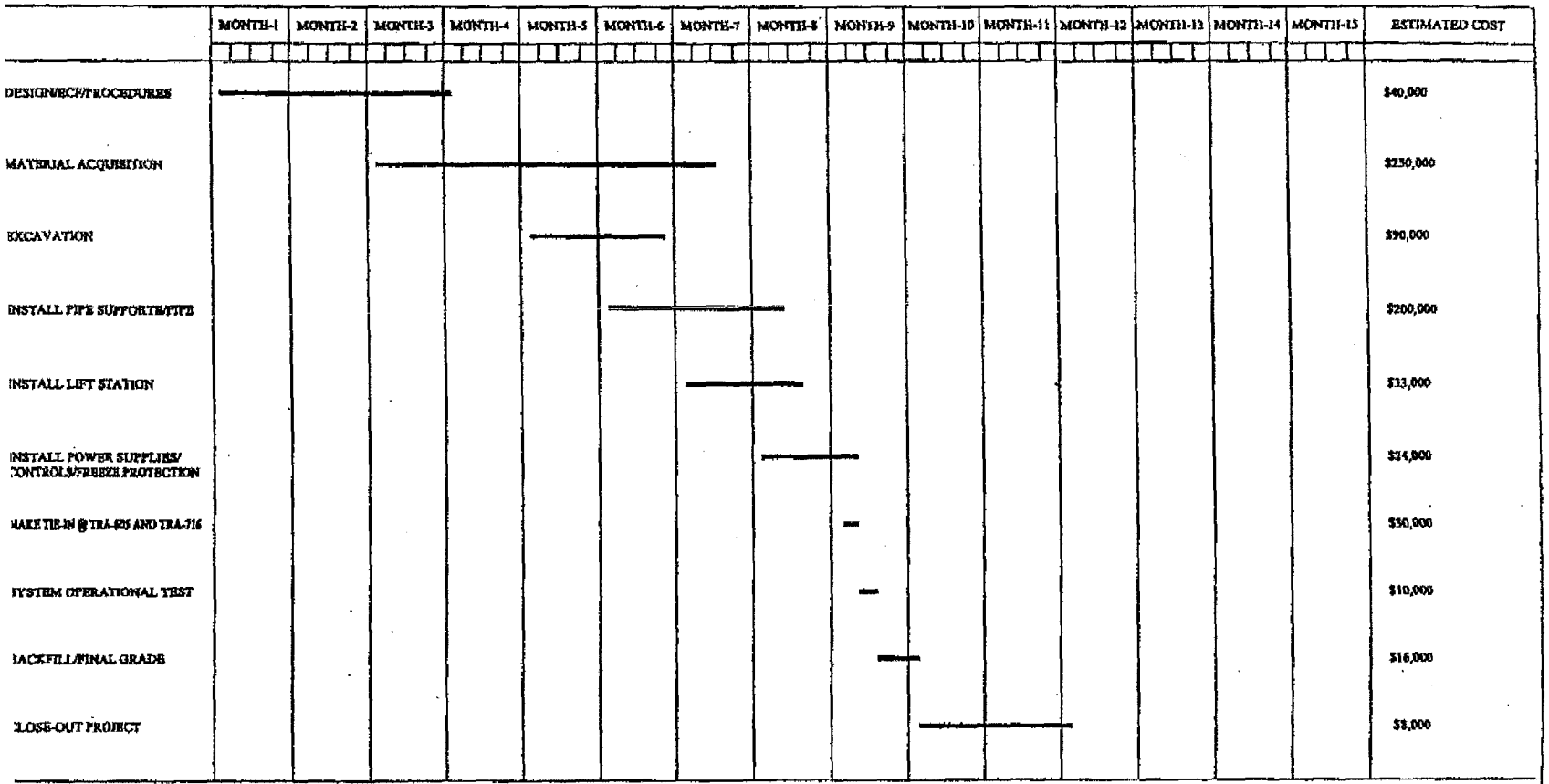
See attached schedule and cost estimates which assume only minimal interference with other utility services, and no cleanliness issues occur, during the excavation phase of the project. The attached cost figures are rough estimates utilizing 11-inch double wall HDPE pipe. Utilizing stainless steel, double wall pipe, in place of HDPE would add approximately $350,000 to the estimated total cost.

BBWI Cost Estimating has not been consulted for a preliminary detailed burdened cost estimate.

SUMMARY

Replacement of the existing Warm Waste line, with an above grade line, addresses the concern for the integrity of the existing pipe, but it is only a temporary fix. This project would not address the known potential leakage point at TRA-712 Retention Basin identified in EDF TRA-ATR-1296. The retention basin inlet would remain in service fed by other piping not being affected by this upgrade. Installation of an above grade warm drain line does not impact the TRA-712 Retention Basin Isolation project, which would still need to be performed.

INSTALLATION OF ABOVE GRADE WARM WASTE DRAIN LINE



EXCAVATION & INSPECTION OF BURIED WARM WASTE DRAIN LINE

HISTORY

In October 1997, the area immediately south of TRA-605 MTR Process Water Building was excavated in order to perform non-destructive examination (NDE) of Warm Waste piping. NDE of the 30-inch Warm Waste drainpipe indicated general external surface corrosion and pitting. Radiographs performed on the excavated portion of pipe indicated extensive interior deposits, corrosion, and pitting. Although an accurate pipe wall thickness could not be determined utilizing NDE, an engineering evaluation estimated that the pitting was approaching half-wall thickness. Based on the results of the NDE, and the in-service time of 30 to 40 years, Engineering recommended replacement of the TRA Warm Waste System buried piping within the 5 years following April 1998. (EDF: TRA-ATR-1578)

DESCRIPTION

TRA Engineering recently investigated the feasibility of excavating portions of the Warm Waste System piping from TRA-605 to TRA-716 Evaporation Pond Pump Station. Excavation would be performed at locations along the 30-inch drain line most susceptible to degradation. These areas include points where other drain lines tie in, and at the six thrust blocks. Pipe integrity would be maintained while performing radiographic non-destructive examinations (NDE).

This project would identify general pipe conditions local to the area excavated. The remaining buried pipe would still be considered suspect, and would need to be replaced during the Warm Waste portion of the Utilities Upgrade project.

ADVANTAGES

Advantages of excavation and inspection include:

1. Minimal excavation at strategic points.
2. May be able to justify extending life of pipe based on conditions at excavated areas

DISADVANTAGES

Disadvantages of excavation and inspection include:

1. A majority of the buried pipe will not be inspected and will remain suspect.
2. NDE by radiograph will not give exact wall thickness and/or material conditions due to interior pipe scale
3. Permanent fix will still need to be performed
4. Possible loss of all funds invested if excavation shows leaks or impending leaks.

OPERATIONAL IMPACTS

There would be no impact to operations during excavation and inspection of the buried pipe. If this work is performed during winter weather conditions, it is assumed precautions would be taken for freeze protection.

EXCAVATION & INSPECTION OF BURIED WARM WASTE DRAIN LINE

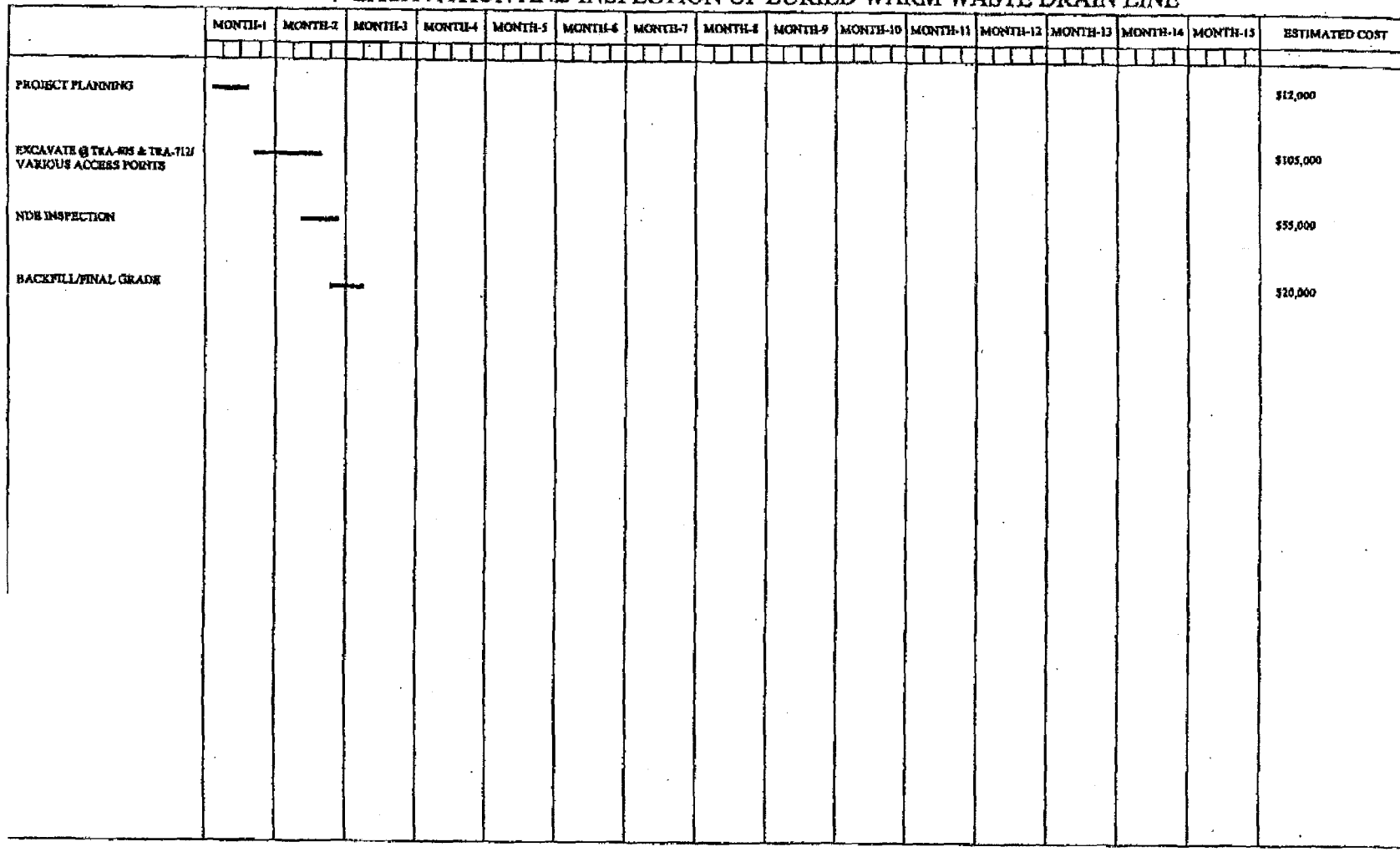
SCHEDULE & COSTS

See attached schedule and cost estimates which assume only minimal interference with other utility services, and no cleanliness issues occur, during the excavation phase of the project. The attached cost figures are rough estimates. BBWI Cost Estimating has not been consulted for a preliminary detailed burdened cost estimate.

SUMMARY

Non-destructive examination of strategic sections of the buried 30-inch drain line would give information about the general condition of the pipe at those areas. Extensive lengths of pipe would not be inspected and therefore continue to be suspect to degradation.

EXCAVATION AND INSPECTION OF BURIED WARM WASTE DRAIN LINE



	MONTH-1	MONTH-2	MONTH-3	MONTH-4	MONTH-5	MONTH-6	MONTH-7	MONTH-8	MONTH-9	MONTH-10	MONTH-11	MONTH-12	MONTH-13	MONTH-14	MONTH-15	ESTIMATED COST
PROJECT PLANNING																$12,000
EXCAVATE @ TRA-805 & TRA-712/ VARIOUS ACCESS POINTS																$105,000
NDE INSPECTION																$55,000
BACKFILL/FINAL GRADE																$20,000

SUBTOTAL	$192,000
35% CONTINGENCY	
ESTIMATED TOTAL COST	$259,000

NOTE TO FILE
Reference 11

System Identification: TRA-63
Note to File Author: Kathryn M. Jensen, North Wind, Inc.

Memo of Conversation

Date: September 8, 2003
Person: John McQuary

Subject: TRA-605 Warm Waste Line (TRA-63)

Details

John McQuary was the TRA Project Manager for the 30" Warm Waste Piping Replacement project. In a telephone conversation on September 8, 2001, John provided the following information:

- From ATR, wastewater was transferred to a dip tube outside TRA-605 through a 10" pipeline. From the dip tube, the water was pumped through the TRA-605 monitoring system and discharged to the 4" warm waste piping. The 4" warm waste pipeline fed into the 30" warm waste pipeline.
- During the TRA Warm Waste Piping (30") Replacement project, soil was excavated in the vicinity of the 4" pipeline. Contaminated soil was identified and placed in 55-gallon drums. Each drum was barcoded by WGS (Leroy Ewing) and shipped to RWMC. However, the drums of soil were stored for a period of time on a Pad near ATR.
- A fiberglass sleeve was placed around the break in the 4" pipeline. They removed contaminated soil only to repair the break, but not necessarily to remove all contaminated soil. They did not chase the contamination. They dug a hole approximately 1 foot below the pipe to gain access to the break in the pipe and complete the pipe repair. Mr. McQuary indicated that it is still likely that contaminated soil exists beneath the area because they did not remove all of the contaminated soil.
- The area was backfilled with clean fill material.
- There was constant RADCON surveillance, which is how the contamination was initially identified.
- They drummed approximately 15 drums of contaminated soil. This soil was above and beneath the pipe. They removed soil to approximately 2 feet on each side of the pipe break. In addition, they dug all the way over to the 30" warm waste pipeline, exposing approximately 4 – 5 feet of the 4" warm waste pipeline.
- The 4" warm waste pipeline is approximately 6 feet bgs.
- In 1997, the 4" line was exposed when the 30" warm waste piping was investigated. The 4" pipeline looked good and was intact. However, Mr. McQuary believes that the 4" pipeline may have been broken when the area was backfilled and the soil was compacted. However, no information is available that details exactly how the 4" pipeline broke.

Dave Gibby and Dewayne King completed a calculation for how much water/contamination may have leaked into the soil. The contaminants identified are those that came from ATR.

INFORMATION ONLY

INEL - LITCO
Construction Management

CONSTRUCTION COORDINATORS/ENGINEERS DAILY FIELD REPORT

Date: 10/16/01
Day of Week: Tuesday
Work hours Begin/End: 0700 / 1730

I - Subcontract: *Number:SS01-021047*
Title:TRA Warm Waste Piping (30") Replacement
Subcontractor: Force Account

II - Weather: *Morning: Good*
Afternoon: Good
Impact to critical fieldwork: N/A

III - Milestones & Accomplishments:

IV - Summary of field activities (include who, what, when, where, why, and how much):

*1 - **Description** of work performed with location and workforce (include summary of lower tier work):*
We worked on more excavation with backhoe for trenching the new 14" line by TRA-605 to the east. We worked on putting dirt into four more 55 Gal drums for shipping this will be CID work. We stopped the utili-Vac work at 9:30 because we found a broken 4" pipe with water coming out of it. After 4 hours we went back in and started to dig a bell hole for the fitters to go in and repair the pipe when a cam alarm went off at or around 3:30 in TRA-605 so the Radcon had us leave the area for the rest of the day. 1 Carpenter and 2 Laborers work on the new temperate stairway in TRA-605.

*2 - **ES&H** - status and actions (inspections, surveillance's, findings, good news):*

*3 - **Quality Assurance / Control / Inspection** - actions and status, DR's, CAR's, NCR's, inspections, and surveillance's:*
N/A

*4 - **Schedule** - delays, impacts, and sufficient workforce? status of critical path activities, on schedule?, out of sequence work*
Delay of 2 hours for Cam in TRA-605. Delay of 4 Hours because of broken 4" pipe in excavation.

*5 - **Direction** - field discussions, meetings, visitors, questions, problems, changes (CID's):*

*6 - **Other** - equipment received/removed, vendor data submittals, mat'l deliveries, prod. qualities, photos / videos taken:* N/A
Equipment: 1 Backhoe, 1 Front-end loader, 1 Utili-Vac

*7 - **Action items** - include 1) description, 2) person responsible and 3) need date:*
1) 2) 3)

*8 - **Comments** to subcontractors Daily Construction Log - include date and time received:*
Craft Personnel: 5 Laborers, 2 Operator and 2 fitters & 1 Carpenter for ½ a day

V -Signature: _____ *Name:* Don Jones
Title: J/S

(Initial all pages at the date, if more than one page)

INEL - LITCO
Construction Management

CONSTRUCTION COORDINATORS/ENGINEERS DAILY FIELD REPORT

Date: 10/18/01
Day of Week: Thursday
Work hours Begin/End: 0700 / 1730

I - Subcontract: *Number:SS01-021047*
Title:TRA Warm Waste Piping (30") Replacement
Subcontractor: Force Account

II - Weather: *Morning: Good*
Afternoon: Good
Impact to critical fieldwork: N/A

III - Milestones & Accomplishments:

IV - Summary of field activities (include who, what, when, where, why, and how much):

*1 - **Description** of work performed with location and workforce (include summary of lower tier work):*
We worked on more excavation with backhoe for trenching the new 14" line by TRA-605 to the east they got to the area to turn to the south for about 20 yards. We rapped the 4" broken pipe with some GFE material today to try and fix the leak in the pipe we will try and test it on Monday.

*2 - **ES&H** - status and actions (inspections, surveillance's, findings, good news):*

*3 - **Quality Assurance / Control / Inspection** - actions and status, DR's, CAR's, NCR's, inspections, and surveillance's:*
N/A

*4 - **Schedule** - delays, impacts, and sufficient workforce? status of critical path activities, on schedule?, out of sequence work*
Delay from Inspection for pipe fix-it material we are going to use on the broken 4" pipe. (6hr.1Fitter, 2 Laborers)

*5 - **Direction** - field discussions, meetings, visitors, questions, problems, changes (CID's):*
Install pipe patch and test 4" line.

*6 - **Other** - equipment received/removed, vendor data submittals, mat'l deliveries, prod. qualities, photos / videos taken:* N/A
Equipment: 1 Backhoe, 1 Front-end loader, 1 Utili-Vac

*7 - **Action items** - include 1) description, 2) person responsible and 3) need date:*
1) 2) 3)

*8 - **Comments** to subcontractors Daily Construction Log - include date and time received:*
Craft Personnel: 5 Laborers, 2 Operator and 2 fitters

V -Signature: *Name:* Don Jones
Title: I/S

(Initial all pages at the date, if more than one page)

INFORMATION ONLY

NOTE TO FILE
Reference 13

System Identification: TRA-63
Note to File Author: Kathryn M. Jensen, North Wind, Inc.

Memo of Conversation

Date: September 8, 2003
Person: Leroy Ewing

Subject: TRA-605 Warm Waste Line (TRA-63)

Details

Leroy Ewing was with TRA Waste Generator Services at the time of the 30" Warm Waste Piping Replacement project. In a telephone conversation on September 8, 2001, Leroy provided the following information:

- He barcoded approximately 15 drums of contaminated soil.
- These drums were shipped to RWMC in November 2001. In the interim, they were stored on a pad near ATR.

NOTE TO FILE
Reference 14

System Identification: TRA-63
Note to File Author: Kathryn M. Jensen, North Wind, Inc.

Memo of Conversation

Date: September 8, 2003
Person: Dan Vetter

Subject: TRA-605 Warm Waste Line (TRA-63)

Details

Dan Vetter was a TRA System Engineer for the 30" Warm Waste Piping Replacement project. In a telephone conversation on September 3, 2001, Dan provided the following information:

- A vacuum sucker was used to excavate the soil.
- The piping was not removed because it is standard practice to leave the piping in place bgs and abandoned piping is removed as part of the utilities process.
- The 4" pipeline was capped and abandoned in place. The broken section was cut and caps were installed on both ends. The pipeline was completely emptied of liquid, but there may have still been resin within the piping because the piping was capped but was not cleaned. The exact timeframe is unknown.
- The 4" pipeline was not reused or replaced.
- DOE-ID 2002 letter, dated June 6, 2002, from Kathleen Hain to Dean Nygard and Wayne Pierre, submits the New Site Identification form for approval.

24792

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04/14/99
Rev. 03

NEW SITE IDENTIFICATION

Part A – To Be Completed By Observer

1. Person Initiating Report: David Gibby	Phone: 208-533-4215
Contractor WAG Manager: Steve Wilkinson	Phone: 208-526-4150

2. Site Title: TRA-63 (TRA-605 Warm Waste Line)

3. Describe the conditions that indicate a possible inactive or unreported waste site. Include location and description of suspicious condition, amount or extent of condition and date observed. A location map and/or diagram identifying the site against controlle survey points or global positioning system descriptors shall be included to help with the site visit. Include any known common names or location descriptors for the waste site.

On October 9, 2001, during excavation for replacement of an underground line that carried warm waste, a break in a 4-inch pipe was discovered. The 4-inch pipe is a tributary that feeds into a 30" Warm Waste Pipe that connects TRA-605 (Warm Waste Treatment Facility) to TRA-716 (Warm Waste Pumping Station). A review of records indicates that the break occurred after September 1997. There was no indication of a leaking pipe until excavation around the pipe occurred. The leaking pipe was repaired and warm waste was discharged through an alternate path to the Test Reactor Area Evaporation Pond. The soil in proximity to the pipe is radioactively contaminated. Approximately 50 Ci of tritium may have been released to the soil over time a consequence of this leak.

Part B – To Be Completed By Contractor WAG Manager

4. Recommendation:

☒ This site meets the requirements for an inactive waste site, requires investigation, and should be included in the INEEL FFA/CO Action Plan. Proposed Operable Unit assignment is recommended to be included in the FFA/CO.
WAG: 10 Operable Unit: 10-08

☐ This site DOES NOT meet the requirements for an inactive waste site, DOES NOT require investigation and SHOULD NOT included in the INEEL FFA/CO Action Plan.

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Rev. 03

NEW SITE IDENTIFICATION

5. Basis for the recommendation:

1. Source Description: The source of the wastes associated with this potential site has been identified as the underground inch treated radioactive waste discharge line (WDC-605) from the Warm Waste Treatment Facility (WWTF) located in the Proce Water Building (TRA-605). The radioactive waste water in the pipe is pre-treated water (i.e. most of the radioactive constituents removed by mixed cation/anion resin beds in either the TRA-605 or ATR-670 WWTF). This system receives only radioactively contaminated effluent and does not process any hazardous waste.

The 4-inch line was excavated in 1997 to assess its integrity. At that time corrosion was noted, however, the line was deemed sound for continued use. On October 9, 2001, while excavating soil for a TRA Warm Waste Piping (30-inch) Replacement Proje wet soil was encountered by a construction crew in the vicinity of the 4-inch line. The soil was determined to be radioactively contaminated. Under carefully controlled conditions, excavation was continued to approximately six feet below grade, at which p the 4-inch pipe was uncovered. Water was seen to be seeping from the pipe. Additional investigation revealed that the pipe was broken due to an offset shear of approximately 1/2-inch. The edges of the sheared pipe were corroded, indicating that the break likely had existed for some time. A survey of the soil was performed using a hand-held frisker. The frisker survey confirmed the presence of 300,000 disintegrations per minute (dpm) of contamination in the excavated soil.

Gamma ray spectral analysis was conducted on a sample of water from the excavation site. The analytical results showed that low-level radionuclides were present in the water, consistent with those present in treated ATR and/or TRA-605 warm waste wat

Tritium data was obtained for wastewater discharges from October 1997 through September 2001. Three hundred and fifty-one (351) Ci of tritium were discharged through the line over that time period. A calculation estimated approximately 50 Ci of tritium could have been released from the pipe to the soil since 1997. Complete source contaminant(s) identification and concentration are not known at this time.

2. Exposure Pathway: Potential exposure pathways associated with the drain line could include inhalation, ingestion and absorption through direct contact with either the wastewater or the soils dampened by the leaked wastewater.

3. Potential Contaminants of Concern: At this time a complete list of potential contaminants of concern is not known. Calculations based on waste water discharges through the affected pipe and monthly sampling results since 1997 indicated approximately 50 Ci of tritium could have been released to the soils, approximately 4' to 6' below ground surface. As a complete evaluation of the drain line and its surrounding soils has not been performed, it is impossible to state that the tritium is the only contaminant of concern at this potential site. Since the vertical and lateral extent of the release is unknown, further investigation into potential adverse effects upon human health and the environment is warranted.

4. Description of interfaces with other Programs: Interfaces with other programs would include but not be limited to TRA Facility Operations, Voluntary Consent Order and Environmental Affairs. TRA is an active facility where the potential exists for coming into contact with these materials and/or soils during any construction and/or field activities in this immediate area.

The basis for recommendation must include: (1) source description; (2) exposure pathways; (3) potential contaminants of concern; and (4) descriptions of interfaces with other programs, as applicable (e.g., D&D, Facility Operations, etc.)

6. Contractor WAG Manager Certification: I have examined the proposed site and the information submitted in this document and believe the information to be true, accurate, and complete. My recommendation is indicated in Section 4 above.

Name: Stephen G. Wilkinson Signature: S.G. Wilk Date: 5/14/02

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04/14/99
Rev. 03

NEW SITE IDENTIFICATION

Part C – To Be Completed By INEEL FFA/CO WAG Managers

7. WAG Operable Unit:

DOE WAG Manager's Concurrence: ☒ Concur with recommendation. ☐ Do not concur with the recommendatio

Signature: William E. Nelson

Date: 24 FEB 03

EPA WAG Manager's Concurrence: ☒ Concur with recommendation. ☐ Do not concur with the recommendatio

Signature: Rod Ruan

Date: 9/26/02

State of Idaho WAG Manager's Concurrence: ☒ Concur with recommendation. ☐ Do not concur with the recommendatio

Signature: Clyde A. Cody

Date: 10/15/02

Explanation follows:

Part D – To Be Completed By The INEEL FFA/CO Responsible Program Managers (RPM's)

8. FFA/CO RPM's Concurrence:

For DOE-ID
Name: Kathleen Hain Signature: Kathleen S Hain Date: 2/26/03
☒ Concur
☐ Do not concur. Explanation follows:

For EPA Region X
Name: Wayne Pierre Signature: Wayne Pierre Date: 9/26/02
☒ Concur
☐ Do not concur. Explanation follows:

For State of Idaho
Name: Dean Nygard Signature: Dean Nygard Date: 10/15/02
☒ Concur
☐ Do not concur. Explanation follows:

Idaho National Engineering and Environmental Laboratory

INTEROFFICE MEMORANDUM

Date: October 18, 2001

To: L. E. Ewing MS 7132 3-4363

From: J. A. Daley MS 7111 3-4184

Subject: RML GAMMA-RAY ANALYSIS OF TRA 605 WARM WASTE PIPING REPLACEMENT SAMPLES - JAD-079-01

Two samples (one liquid and one soil) were counted/screened for radioactivity content by the Radiation Measurements Laboratory (RML) using standardized high-resolution gamma-ray spectrometry techniques. The samples were counted in a standardized and calibrated geometry for 2 hours. The analysis results are recorded on the attached Table 1.

Attachment: As Stated

cc:
A. L. Freeman, MS 7111
D. R. King, MS 7112
J. J. Lopez, MS 7110
G. D. McLaughlin, MS 7113
JW Rogers, MS 7113
T. C. Sorensen, MS 7111
J. A. Daley File

Uniform File Code: 6404
Disposition Authority: ENV5-c-1
Retention Schedule: Destroy in 75 years

NOTE: Original disposition authority, retention schedule, and Uniform Filing Code applied by the sender may not be Appropriate for all recipients. Make adjustments as needed.

TABLE 1

RADIATION MEASUREMENTS LABORATORY

GAMMA-RAY ANALYSIS RESULTS

TRA 605 WARM WASTE PIPING REPLACEMENT 2 HOUR COUNTS

Sample ID	RML ID	Manmade Radionuclides	Activity	Estimated Bias (%)
TRA 605 H20	A1101701064	NA-24	(3.0 +/- 0.5)E-06 uCi/ML	0.0
		CR-51	(5.7 +/- 0.4)E-05 uCi/ML	0.0
		MN-54	(1.0 +/- 0.3)E-06 uCi/ML	0.0
		CO-60	(1.92 +/- 0.14)E-04 uCi/ML	0.0
		ZR-95	(5.9 +/- 0.7)E-06 uCi/ML	0.0
		NB-95	(9.1 +/- 0.8)E-06 uCi/ML	0.0
		MO-99	(5.0 +/- 0.8)E-07 uCi/ML	0.0
		SB-124	(6.1 +/- 1.5)E-07 uCi/ML	0.0
		CS-137	(1.03 +/- 0.09)E-05 uCi/ML	0.0
		EU-152	(2.9 +/- 0.2)E-05 uCi/ML	0.0
		EU-154	(2.9 +/- 0.2)E-05 uCi/ML	0.0
		EU-155	(1.08 +/- 0.08)E-05 uCi/ML	0.0
		HF-181	(7.0 +/- 0.5)E-06 uCi/ML	0.0
TRA 605 SOIL	A2101701065	NA-24	(7 +/- 3)E-07 uCi/GM	0.0
		CR-51	(4.5 +/- 0.3)E-04 uCi/GM	0.0
		MN-54	(3.6 +/- 0.3)E-05 uCi/GM	0.0
		CO-58	(2.6 +/- 0.2)E-05 uCi/GM	0.0
		CO-60	(4.6 +/- 0.3)E-03 uCi/GM	0.0
		ZN-65	(1.68 +/- 0.12)E-04 uCi/GM	0.0
		ZR-95	(4.1 +/- 0.3)E-05 uCi/GM	0.0
		NB-95	(8.4 +/- 0.6)E-05 uCi/GM	0.0
		RU-103	(3.7 +/- 0.8)E-06 uCi/GM	0.0
		CS-134	(3.9 +/- 0.3)E-05 uCi/GM	0.0
		CS-137	(5.5 +/- 0.4)E-04 uCi/GM	0.0
		CE-144	(2.8 +/- 0.6)E-05 uCi/GM	0.0
		EU-152	(3.4 +/- 0.3)E-04 uCi/GM	0.0
		EU-154	(3.7 +/- 0.3)E-04 uCi/GM	0.0
		EU-155	(1.17 +/- 0.08)E-04 uCi/GM	0.0
		HF-181	(8.8 +/- 0.6)E-05 uCi/GM	0.0
		TA-182	(1.7 +/- 0.2)E-05 uCi/GM	0.0

Please see the notes on the following page.

TABLE 1 CONTINUED

Sample ID	RML ID	Manmade Radionuclides	Activity	Estimated Bias (%)

otes: (1) A "None Detected" under "Manmade Radionuclides" means that the analyst determined that no manmade true-positive radionuclides were present in the respective sample(s).
(2) The uncertainty associated with any reported activity includes the statistical uncertainty and estimated uncertainties in the detector efficiency and the sample geometry (both are typically 5%). Uncertainties are propagated in quadrature and expressed as one standard deviation.
(3) When a sample's matrix differs radically from that of the calibration standard used by the RML, the measured activity may not accurately represent the true radionuclide concentration in that sample. In such cases, a non-zero estimated bias is applied in place of the estimated sample geometry; this bias is not propagated into the total uncertainty and is listed separately.

R D Gibby 11/19/2001 10:16 AM

To: Julie E Conner@Exchange
cc: Joe C Midgett/MIDGJC/CC01/INEEL/US@INEL, Janis L Sherick/NIS/CC01/INEEL/US@INEL, Brad L Swanson/SWANBL/CC01/INEEL/US@INEL, Chere D Morgan/CHER/CC01/INEEL/US@INEL
Subject: Tritium Release from 4 inch Line

8769 ref

Julie,

In response to your request from our meeting last Thursday, I am providing information relative to potential release of tritium associated with the 4-inch broken warm waste line.

Tritium data was obtained for wastewater discharges from October 1997 through September 2001. A total of 351 Ci of tritium was discharged through the line over that time period.

The ratio of the surface area of the crack to the cross-sectional area of the pipe is approximately 0.13. If we then assume that 13% of the discharge through the pipe was lost through the crack then approximately 46 Ci of tritium could have been released. Again, we do not know when the crack in the pipe occurred and we can only estimate the amount of water that might have leaked from the pipe. The numbers provided serve to bound the potential for release.

If you have further questions please feel free to contact me.

David

COPY

441.45#
10/10/97
Rev. #03

RADIOLOGICAL SURVEY REPORT

QUALITY RECORD

BARCODE # 5308

BLDG.: TRA 605
AREA/ROOM: North of TRA605
RWP #: 3100609-00
LOG #: 16
DATE: 10-15-01
TIME: 1600

☐ ROUTINE
☒ NON ROUTINE (SPECIFY) ☐ FOLLOW UP

JOB DESCRIPTION

COMMENTS:
SPECIAL CONTAMINATION SURVEYS TAKEN DURING 605-636 WARM WASTE LINE TIE-IN EXCAVATION

RCT: M.S. RAY / MR / PRINT/SIGNATURE

REVIEWED BY: D J Wilson

Scans

dirt removed from trench running East to West

441.45#
10/10/97
Rev. #03

RADIOLOGICAL SURVEY REPORT

INSTRUMENTS		
Type	Serial #	Efficiency
ZA	800058	10 %
		%
		%
Scaler		%βγ
		%α

SURVEY DATA AND LEGEND

ALL SWIPE, LARGE AREA WIPE (LAW), AND DIRECT SCAN SURVEY LOCATIONS ARE IDENTIFIED ON THE MAP. THOSE LOCATIONS WHERE ACTIVITY IS GREATER THAN OR EQUAL TO THE RADCON MANUAL (RCM) TABLE 2-2 LIMITS* ARE RECORDED BELOW.

SWIPE No.	LAW No.	DIRECT SCAN No.	LOCATION OR ITEM DESCRIPTION	SWIPE/SCAN (dpm/100cm²)		LAW (dpm)	
				βγ	α	βγ	α
*		*	RCM Table 2-2 limits used for this survey.	1000/5000	20 N/A		

CA Contamination Area
HCA High Contamination Area
RA Radiation Area
HRA High Radiation Area
VHRA Very High Radiation Area
RMA Radioactive Material Area
ARA Airborne Radioactivity Area
RBA Radiological Buffer Area
FCA Fixed Contamination Area
SCA Soil Contamination Area
URMA Underground Radioactive Material Area
SOP Step-Off Pad

-x—x- Radiological Barrier

ALL dose rates are in mrem/hr, unless otherwise noted.

General Area Dose Rate
#@#(cm) Dose Rate at Distance From Source
*# Contact Dose Rate
#β / #γ Beta Corrected / Gamma Dose Rates
α Alpha
β Beta
γ Gamma
n Neutron

□ = Direct Scan
○ = Swipe (Smear)
L = Large Area Wipe (LAW)
△ = Air Sample
⌂ = Tritium Swipe

441.45#
10/10/97
Rev. #03

RADIOLOGICAL SURVEY REPORT COPY

QUALITY RECORD

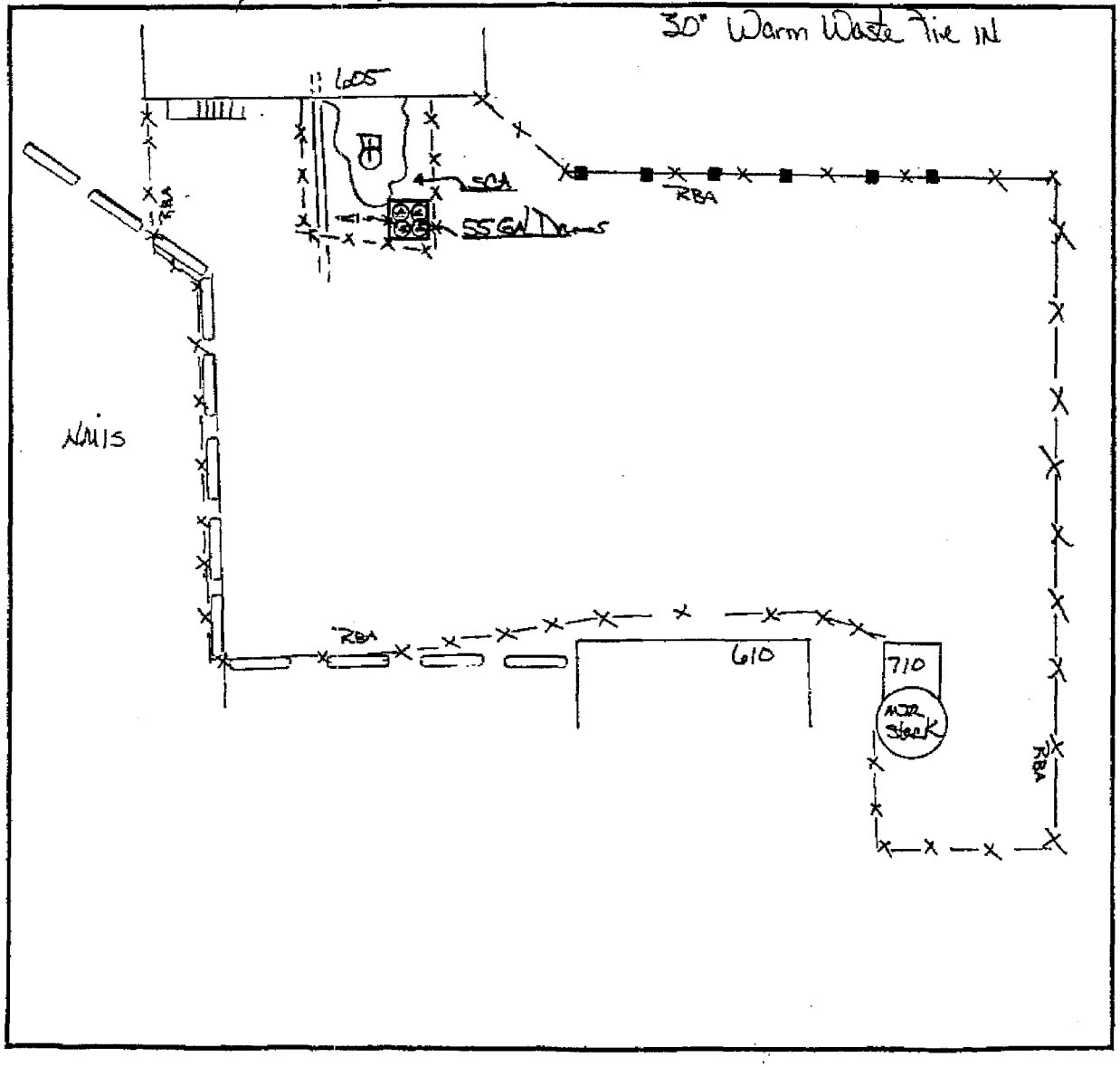
BARCODE # 5308

BLDG.: 605
AREA/ROOM: Warm Waste
RWP #: 3100157 01
LOG #: 1
DATE: 10/15/01
TIME: 1155

☐ ROUTINE JOB DESCRIPTION
☒ NON ROUTINE (SPECIFY) ☐ FOLLOW UP
COMMENTS:

RCT: B. Chapple B. Unger
PRINT/SIGNATURE

REVIEWED BY: D. Winton



441.45#
10/10/97
Rev. #03

RADIOLOGICAL SURVEY REPORT

INSTRUMENTS		
Type	Serial #	Efficiency
2A	50130	10 %
		%
		%
Scaler	236835	33.1 %βγ
		24.2 %α
2350	80204	

SURVEY DATA AND LEGEND

ALL SWIPE, LARGE AREA WIPE (LAW), AND DIRECT SCAN SURVEY LOCATIONS ARE IDENTIFIED ON THE MAP. THOSE LOCATIONS WHERE ACTIVITY IS GREATER THAN OR EQUAL TO THE RADCON MANUAL (RCM) TABLE 2-2 LIMITS* ARE RECORDED BELOW.

SWIPE No.	LAW No.	DIRECT SCAN No.	LOCATION OR ITEM DESCRIPTION	SWIPE/SCAN (dpm/100cm²)		LAW (dpm)	
				βγ	α	βγ	α
*		*	RCM Table 2-2 limits used for this survey.	1000/5000	20 / N/A		
—	—	1	Contaminated Soil	20,000	N/A	—	—

CA	Contamination Area	-x—x-	Radiological Barrier	□	= Direct Scan
HCA	High Contamination Area				
RA	Radiation Area	ALL dose rates are in mrem/hr, unless otherwise noted.		○	= Swipe (Smear)
HRA	High Radiation Area				
VHRA	Very High Radiation Area	#	General Area Dose Rate	L	= Large Area Wipe (LAW)
RMA	Radioactive Material Area	#@#(cm)	Dose Rate at Distance From Source		
ARA	Airborne Radioactivity Area	*#	Contact Dose Rate	△	= Air Sample
RBA	Radiological Buffer Area	#β / #γ	Beta Corrected / Gamma Dose Rates		
FCA	Fixed Contamination Area	α	Alpha	⌂	= Tritium Swipe
SCA	Soil Contamination Area	β	Beta		
URMA	Underground Radioactive Material Area	γ	Gamma		
SOP	Step-Off Pad	n	Neutron		

441.45#
10/10/97
Rev. #03

RADIOLOGICAL SURVEY REPORT

QUALITY RECORD

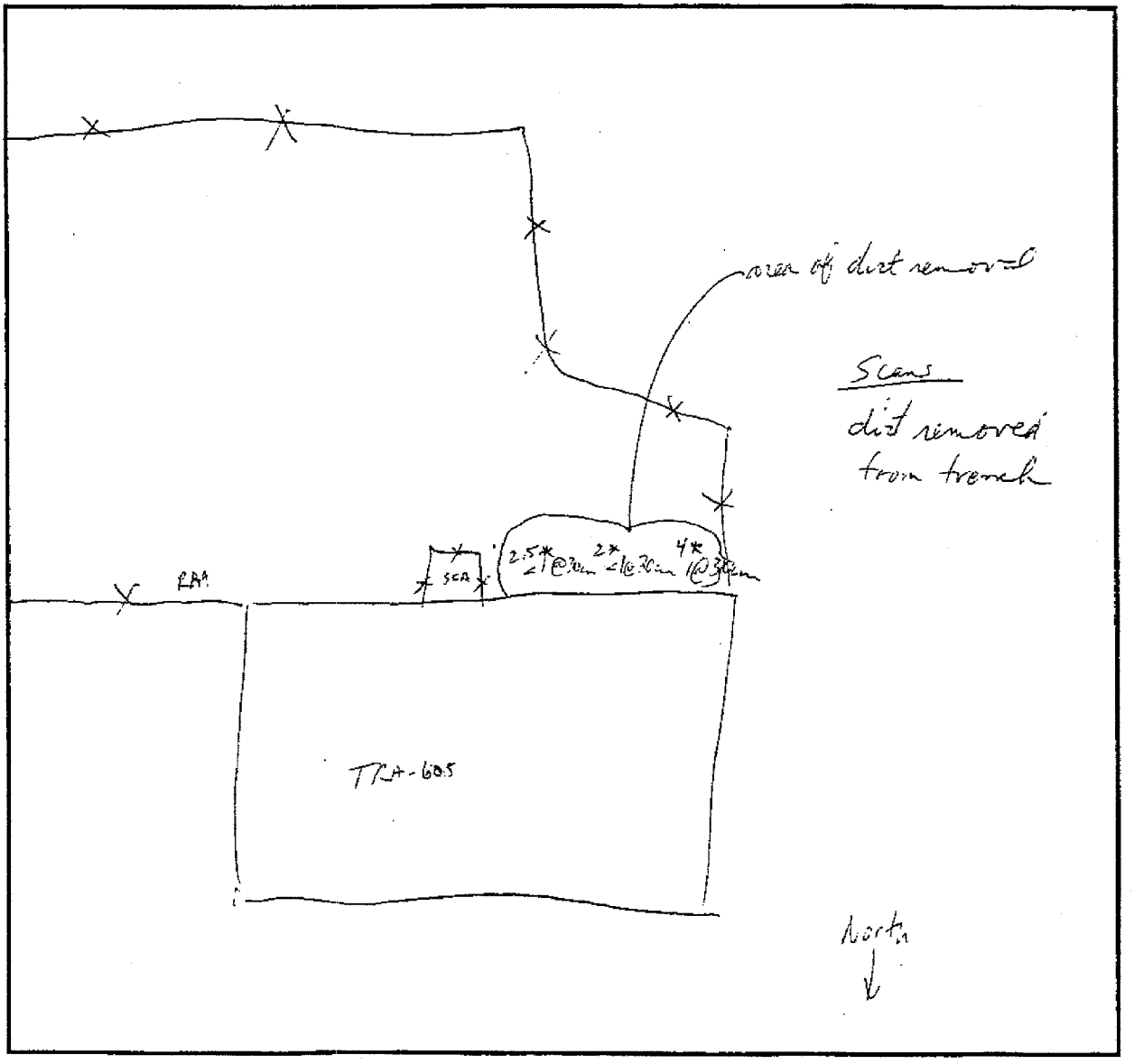
BARCODE # 5303

BLDG.: TRA 605
AREA/ROOM: warm waste D...
RWP #: 31001604-00
LOG #: 12
DATE: 11-1-01
TIME: 1650

☐ ROUTINE **JOB DESCRIPTION**
☒ NON ROUTINE (SPECIFY) ☐ FOLLOW UP
COMMENTS: SPECIAL CONTAMINATION & RADIATION SURVEYS TAKEN AFTER REMOVING DIRT FROM 4" PIPE RUN

RCT: M.S. RAY / [signature] PRINT/SIGNATURE

REVIEWED BY: [signature]



441.45#
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Rev. #03

RADIOLOGICAL SURVEY REPORT

INSTRUMENTS		
Type	Serial #	Efficiency
2A	500034	10 %
		%
		%
Scaler		%βγ
		%α
RS050E	801824	

SURVEY DATA AND LEGEND

ALL SWIPE, LARGE AREA WIPE (LAW), AND DIRECT SCAN SURVEY LOCATIONS ARE IDENTIFIED ON THE MAP. THOSE LOCATIONS WHERE ACTIVITY IS GREATER THAN OR EQUAL TO THE RADCON MANUAL (RCM) TABLE 2-2 LIMITS* ARE RECORDED BELOW.

SWIPE No.	LAW No.	DIRECT SCAN No.	LOCATION OR ITEM DESCRIPTION	SWIPE/SCAN (dpm/100cm²)		LAW (dpm)	
				βγ	α	βγ	α
*	[redacted]	*	RCM Table 2-2 limits used for this survey.	1000 / 5000	20 / n/a	[redacted]	[redacted]

CA	Contamination Area	-x—x-	Radiological Barrier	□	= Direct Scan
HCA	High Contamination Area				
RA	Radiation Area	ALL dose rates are in mrem/hr, unless otherwise noted.		○	= Swipe (Smear)
HRA	High Radiation Area				
VHRA	Very High Radiation Area	#	General Area Dose Rate	L	= Large Area Wipe (LAW)
RMA	Radioactive Material Area	#@#(cm)	Dose Rate at Distance From Source		
ARA	Airborne Radioactivity Area	"#	Contact Dose Rate	△	= Air Sample
RBA	Radiological Buffer Area	#β / #γ	Beta Corrected / Gamma Dose Rates		
FCA	Fixed Contamination Area	α	Alpha	⬡	= Tritium Swipe
SCA	Soil Contamination Area	β	Beta		
URMA	Underground Radioactive Material Area	γ	Gamma		
SOP	Step-Off Pad	n	Neutron		

441.45#
10/10/97
Rev. #03

COPY

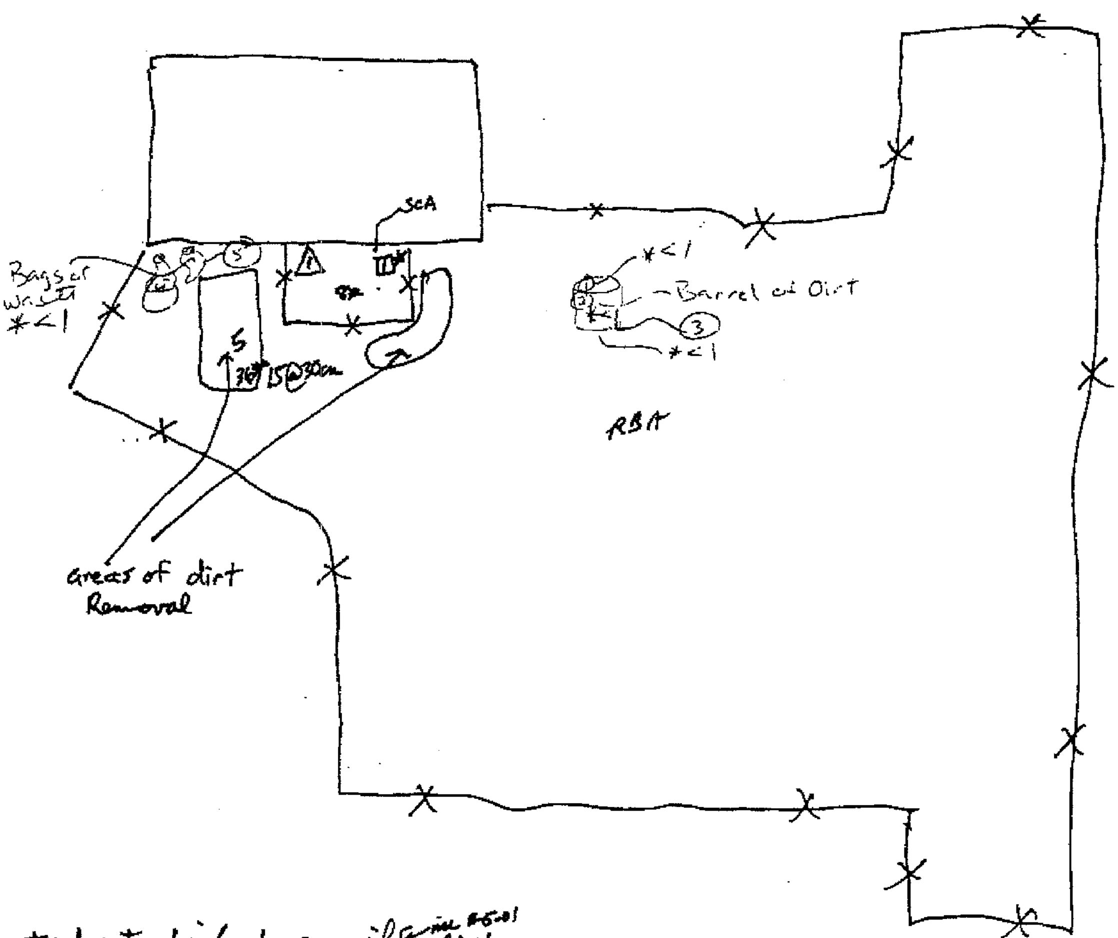
RADIOLOGICAL SURVEY REPORT

QUALITY RECORD

BARCODE # 5308

BLDG.: TRA-605	☐ ROUTINE **JOB DESCRIPTION**
AREA/ROOM: Warm Waste Dig	☒ NON ROUTINE (SPECIFY) ☐ FOLLOW UP
RWP #: 31001604-03	COMMENTS: SPECIAL CONTAMINATION AND RADIATION
LOG #: 8	SURVEYS IN AREAS OF DIRT REMOVAL FROM
DATE: 11-5-01	WARM WASTE TIE IN PIPING
TIME: 1630	

RCT: M.S. RA... 1630 S. RA... / [signature] PRINT/SIGNATURE REVIEWED BY: [signature]



*=denotes highest scan of dirt

441.45#
10/10/97
Rev. #03

RADIOLOGICAL SURVEY REPORT

INSTRUMENTS		
Type	Serial #	Efficiency
2A	801624	10 %
2A	800106	10 %
		%
Scaler	236835	33.1 %βγ
		24.2 %α
RSO50G	801824	
RSO50G	801802	

SURVEY DATA AND LEGEND

ALL SWIPE, LARGE AREA WIPE (LAW), AND DIRECT SCAN SURVEY * LOCATIONS ARE IDENTIFIED ON THE MAP. THOSE LOCATIONS WHERE ACTIVITY IS GREATER THAN OR EQUAL TO THE RADCON MANUAL (RCM) TABLE 2-2 LIMITS* ARE RECORDED BELOW.

SWIPE No.	LAW No.	DIRECT SCAN No.	LOCATION OR ITEM DESCRIPTION	SWIPE/SCAN (dpm/100cm²)		LAW (dpm)	
				βγ	α	βγ	α
*	[redacted]	*	RCM Table 2-2 limits used for this survey.	1000 5000	20 n/a	[redacted]	[redacted]
		1	dirt removed from around buried pipe	8000	n/a		

CA	Contamination Area	-x—x-	Radiological Barrier
HCA	High Contamination Area		
RA	Radiation Area	ALL dose rates are in mrem/hr, unless otherwise noted.	
HRA	High Radiation Area		
VHRA	Very High Radiation Area	#	General Area Dose Rate
RMA	Radioactive Material Area	#@#(cm)	Dose Rate at Distance From Source
ARA	Airborne Radioactivity Area	*#	Contact Dose Rate
RBA	Radiological Buffer Area	#β / #γ	Beta Corrected / Gamma Dose Rates
FCA	Fixed Contamination Area	α	Alpha
SCA	Soil Contamination Area	β	Beta
URMA	Underground Radioactive Material Area	γ	Gamma
SOP	Step-Off Pad	n	Neutron

□ = Direct Scan
○ = Swipe (Smear)
L = Large Area Wipe (LAW)
△ = Air Sample
⬡ = Tritium Swipe

REPORATABLE QUANTITY CALCULATIONS FOR 40 CFR 302.6(b) COMPLIANCE

Revised 10/25/01

30" Warm Waste Line Excavation Contamination Estimated Radionuclide Activity and 40 CFR 302 RQ Comparision

On 10/09/01, during excavation for the TRA 30" Warm Waste Line replacement, radiological soil contamination was encountered. A soil sample was collected for radiological analyses. On 10/16/01 a 4" warm waste line was uncovered and discovered to be leaking. A water and soil sample was collected for radiological analyses. On 10/18/01 approximately 2 cups of resin was discovered in the soil. A soil/resin sample was collected for radiological analyses. These Release Quantity (RQ) calculations are based on the 10/16/01 water sample and the 10/18/01soil/water sample.

In accordance with 40 CFR 302.6(b) the 24-Hour release RQ for a radionuclide mixture is 1. 40 CFR 302.6(b)(2)(ii). If the identity and quantity (in curies) of each radionuclide in a released mixture or solution is known, the ratio between the quantity released (in curies) and the RQ for the radionuclide must be determined for each radionuclide. The only such releases subject to this section's notification requirements are those in which the sum of the ratios for the radionuclides in the mixture or solution released is equal to or greater than one.

RQ (Sum of Ratios) = 1

The sum of the RQ ratios = **8.01E-02** (Significant contribution from gross beta assumed to be Sr-90)

Total estimated Ci release = **9.28E-02 Ci**

Table 1. Estimated radionuclide release based on water sample. [a,h]

Radionuclide	Sample Activity uCi/ml	Release [b,c] Ci	24-Hour RQ [d] Ci	24-Hour RQ Release Ratio	$t_{1/2}$ (h)	Exceeds RQ
H-3 [h]	9.35E-03	1.22E-04	100	1.22E-06	107748	NO
Na-24	3.0E-06	1.19E-07	10	1.19E-08	14.96	NO
Cr-51	5.7E-05	7.60E-07	1000	7.60E-10	664.8	NO
Mn-54	1.0E-06	1.30E-08	10	1.30E-09	7492.8	NO
Co-60	1.92E-04	2.50E-06	10	2.50E-07	46174.0	NO
Nb-95	9.1E-06	1.21E-07	10	1.21E-08	839.3	NO
Zr-95	5.9E-06	7.75E-08	10	7.75E-09	1536.5	NO
Mo-99	5.0E-07	8.37E-09	100	8.37E-11	65.9	NO
Sb-124	6.1E-07	8.02E-09	10	8.02E-10	1444.8	NO
Cs-137	1.03E-05	1.34E-07	1	1.34E-07	264289.2	NO
Eu-152	2.9E-05	3.77E-07	10	3.77E-08	118084.8	NO
Eu-154	2.9E-05	3.77E-07	10	3.77E-08	118084.8	NO
Eu-155	1.08E-05	1.40E-07	10	1.40E-08	41259.6	NO
Hf-181	7.0E-06	9.25E-08	10	9.25E-09	1017.6	NO
Gross Alpha [e,f]	8.0E-07	1.04E-08	0.01	1.04E-06	3784320.0	NO
Gross Beta [g]	2.8E-04	3.64E-06	0.1	3.64E-05	254916	NO
Totals	-	1.30E-04	-	3.92E-05	-	-

a. Analytical results are listed in the 10-18-01 J. A. Daley letter to L. E. Ewing (JAD-079-01), RML ID # A1101701064. Other than H-3, analytical data is not yet available for isotopic alpha and beta emitters.

b. Estimated liquid volume = 1.30E+01 liters
Volume scaled from photograph (4" pipe diameter). Standing liquid dimensions approximately (18.7" x 10. 7" x 4")

c. Decay correction, t = 2.40E+01 hours
Decay correction equation $A_0 = A / e^{-Lt}$ L = $0.6931 / t_{1/2}$

d. 40 CFR 302 reportable quantities (RQ).

e. No gross alpha detection. MDA is the concentration used as a surrogate for the concentration.

f. Analytical results are listed in 10-18-01 John Elsenmenger letter to Leroy Ewing (JGE-05-2001). In the evaluation if an RQ is exceeded, Gross Alpha is assumed represented as Am-241. Of the probable alpha emitters present Am-241 has one of the lowest RQs (0.01).

g. Analytical results are listed in 10-18-01 John Elsenmenger letter to Leroy Ewing (JGE-05-2001). In the evaluation if an RQ is exceeded Gross Beta is assumed represented as Sr-90. Of the probable beta emitters presen, Sr-90 has one of the lowest RQs (0.1).

h. Analytical results are listed in 10-24-01 R. L. Cummins e-mail to L. E. Ewing.

10-09-01 30 Inch WW Line Excavation Contamination RQ Calculations.xls
Page 1

REPORATABLE QUANTITY CALCULATIONS FOR 40 CFR 302.6(b) COMPLIANCE

Table 2. Estimated radionuclide release based on soil sample.

Radionuclide	Sample Activity pCi/g	Release [b,c] Ci	24-Hour RQ [d] Ci	24-Hour RQ Release Ratio	$t_{1/2}$ (h)	Exceeds RQ
Na-24	7E-01	7.98E-06	10	7.98E-07	14.96	NO
Cr-51*	7.0E+03	2.69E-02	1000	2.69E-05	664.8	NO
Mn-54	8.9E+01	3.34E-04	10	3.34E-05	7492.8	NO
Co-57	3.9E+02	1.47E-03	100	1.47E-05	6523.2	NO
Co-58	1.14E+02	4.38E-04	1000	4.38E-07	664.8	NO
Fe-59	1.95E+01	7.42E-05	10	7.42E-06	1068.24	NO
Co-60	1.03E+04	3.86E-02	10	3.86E-03	46173.96	NO
Zn-65	3.70E+02	1.39E-03	10	1.39E-04	5851.2	NO
Nb-95	7.1E+02	2.71E-03	10	2.71E-04	839.28	NO
Zr-95	4.5E+02	1.70E-03	10	1.70E-04	1536.48	NO
Ru-103	5.4E+01	2.06E-04	10	2.06E-05	942.48	NO
Ru/Rh-106	2.18E+02	8.19E-04	1	8.19E-04	8942.4	NO
Cs-134	7.7E+01	2.89E-04	1	2.89E-04	264289.2	NO
Cs-137	6.6E+02	2.47E-03	1	2.47E-03	264289.2	NO
Ce-141	1.45E+01	5.55E-05	10	5.55E-06	780	NO
Ce-144	1.9E+02	7.14E-04	1	7.14E-04	6830.4	NO
Eu-152	5.2E+02	1.95E-03	10	1.95E-04	118084.8	NO
Eu-154	4.6E+02	1.72E-03	10	1.72E-04	118084.8	NO
Eu-155	1.56E+02	5.85E-04	10	5.85E-05	41259.6	NO
Hf-181	8.0E+02	3.05E-03	10	3.05E-04	1017.6	NO
Ta-182	7.7E+01	2.90E-04	10	2.90E-05	2746.3	NO
Gross Alpha [f,g]	4.9E+00	1.84E-05	0.01	1.84E-03	3784320.0	NO
Gross Beta [h]	1.8E+03	6.86E-03	0.1	6.86E-02	254916	NO
Totals	-	9.27E-02	-	8.00E-02	-	-

a. Analytical results are from RML Sample ID # D4102301072.
Analytical data is not yet available for isotopic alpha and beta emitters.

b. Estimated soil volume removed = 1874 liters (9 55-gallon drums)(1 cubic yard = 764.55 liters)

c. Decay correction, t = 2.40E+01 hours
Decay correction equation $A_0 = A / e^{-Lt}$ L = $0.6931 / t_{1/2}$

d. 40 CFR 302 reportable quantities (RQ).

e. Estimated soil density = 2 g/mL

f. Analytical results are listed in 10-18-01 John Eisenmenger letter to Leroy Ewing (JGE-05-2001). In the evaluation if an RQ is exceeded, Gross Alpha is assumed represented as Am-241. Of the probable alpha emitters present Am-241 has one of the lowest RQs (0.01).

g. Analytical results are listed in 10-18-01 John Eisenmenger letter to Leroy Ewing (JGE-05-2001). In the evaluation if an RQ is exceeded Gross Beta is assumed represented as Sr-90. Of the probable beta emitters presen, Sr-90 has one of the lowest RQs (0.1).

2.45081 cu yd.

REPORATABLE QUANTITY CALCULATIONS FOR 40 CFR 302.6(b) COMPLIANCE

21 Month Maximum Daily Effluent Discharge To TRA Evaporation Pond Bounding Calculation

The following table uses the maximum daily effluent discharge to the TRA Evaporation Pond to bound a worst case scenario for 24-hour release to the soil. The maximum was 3.06E+05 liters (80941 gallons).

The sum of the RQ ratios = **9.22E-01** (Significant contribution from gross beta assumed to be Sr-90)

Total estimated Ci release = **3.15E-03 Ci**

Since the gross beta is a significant contribution to the release calculations, and Sr-90 is assumed to represent the gross beta results pending isotope specific data, a 21 month review of Sr-90 discharge to the TRA Evaporation Pond was performed. The maximum monthly discharge of Sr-90 was 0.099 Ci.

It is highly unlikely that the Sr-90 24-hour RQ was exceeded since the bounding calculation is based on the maximum daily flow and the maximum monthly Sr-90 discharge does not exceed the Sr-90 RQ.

Table 3. Bouding calculation based 21 month maximum daily flow. [a,h]

Radionuclide	Sample Activity uCi/ml	Release [b,c] Ci	24-Hour RQ [d] Ci	24-Hour RQ Release Ratio	$t_{1/2}$ (h)	Exceeds RQ
H-3 [h]	9.35E-03	2.86E+00	100	2.86E-02	107748	NO
Na-24	3.0E-06	2.79E-03	10	2.79E-04	14.96	NO
Cr-51	5.7E-05	1.79E-02	1000	1.79E-05	664.8	NO
Mn-54	1.0E-06	3.07E-04	10	3.07E-05	7492.8	NO
Co-60	1.92E-04	5.88E-02	10	5.88E-03	46174.0	NO
Nb-95	9.1E-06	2.84E-03	10	2.84E-04	839.3	NO
Zr-95	5.9E-06	1.83E-03	10	1.83E-04	1536.5	NO
Mo-99	5.0E-07	1.97E-04	100	1.97E-06	65.9	NO
Sb-124	6.1E-07	1.89E-04	10	1.89E-05	1444.8	NO
Cs-137	1.03E-05	3.15E-03	1	3.15E-03	264289.2	NO
Eu-152	2.9E-05	8.88E-03	10	8.88E-04	118084.8	NO
Eu-154	2.9E-05	8.88E-03	10	8.88E-04	118084.8	NO
Eu-155	1.08E-05	3.31E-03	10	3.31E-04	41259.6	NO
Hf-181	7.0E-06	2.18E-03	10	2.18E-04	1017.6	NO
Gross Alpha [e,f]	8.0E-07	2.45E-04	0.01	2.45E-02	3784320.0	NO
Gross Beta [g]	2.8E-04	8.57E-02	0.1	8.57E-01	254916	NO
Totals	-	3.06E+00	-	9.22E-01	-	-

a. Analytical results are listed in the 10-18-01 J. A. Daley letter to L. E. Ewing (JAD-079-01), RML ID # A1101701064. Other than H-3, analytical data is not yet available for isotopic alpha and beta emitters.

b. Estimated liquid volume = 3.06E+05 liters
21 month history maximum daily flow on 01/25/01 of 80941 gallons.

c. Decay correction, t = 2.40E+01 hours
Decay correction equation $A_0 = A / e^{-Lt}$ L = $0.6931 / t_{1/2}$

d. 40 CFR 302 reportable quantities (RQ).

e. No gross alpha detection. MDA is the concentration used as a surrogate for the concentration.

f. Analytical results are listed in 10-18-01 John Eisenmenger letter to Leroy Ewing (JGE-05-2001). In the evaluation if an RQ is exceeded, Gross Alpha is assumed represented as Am-241. Of the probable alpha emitters present Am-241 has one of the lowest RQs (0.01).

g. Analytical results are listed in 10-18-01 John Eisenmenger letter to Leroy Ewing (JGE-05-2001). In the evaluation if an RQ is exceeded Gross Beta is assumed represented as Sr-90. Of the probable beta emitters presen, Sr-90 has one of the lowest RQs (0.1).

h. Analytical results are listed in 10-24-01 R. L. Cummins e-mail to L. E. Ewing.

10/25/01

Tritium Review (H-3)

Water sampled (10/16/01) at the TRA 30" Warm Waste Replacement Project excavation had a H-3 concentration of:

9.35E+03 pCi/mL (1.07E+07 liters would cause the 24 hour RQ to be exceeded)

For comparision, the past twenty-one months H-3 discharge to the TRA Evaporation is summarized below.
The Reportable Quantity (RQ) for H-3 is 100 curies.

Month Ending	Total Monthly Effluent Volume (L)	Average Daily Effluent Volume (L)	Average Daily Effluent Volume (gal)	Maximum Daily Effluent Volume (gal)	Total Curies (Ci)	Curie Concentration (uCi/ml)	Maximum Curie Per Day (Ci/day)
9/20/01	2.079E+06	6.71E+04	17718	56533	13.9	6.71E-03	1.44
8/20/01	1.153E+06	3.72E+04	9827	53640	7	6.07E-03	1.23
7/20/01	2.198E+06	7.33E+04	19357	52702	6.02	2.74E-03	0.55
6/20/01	2.149E+06	6.93E+04	18315	37811	1.96	9.14E-04	0.13
5/20/01	1.982E+06	6.61E+04	17455	41609	8.64	4.36E-03	0.69
4/20/01	1.915E+06	6.18E+04	16321	60014	4.27	2.23E-03	0.51
3/20/01	1.252E+06	4.32E+04	11406	61670	10.4	8.29E-03	1.94
2/20/01	1.713E+06	5.53E+04	14599	80941	5.95	3.47E-03	1.06
1/20/01	2.151E+06	6.94E+04	18332	64638	1.39	6.46E-04	0.16
12/20/00	1.066E+06	3.55E+04	9388	16243	7.86	7.37E-03	0.45
11/20/00	2.282E+06	7.36E+04	19449	74425	6.5	2.85E-03	0.80
10/20/00	1.531E+06	5.10E+04	13483	44927	10.1	6.60E-03	1.12
9/20/00	9.369E+05	3.02E+04	7985	8000	10.7	1.14E-02	0.35
8/20/00	1.985E+06	6.40E+04	16917	46465	8.91	4.49E-03	0.79
7/20/00	1.031E+06	3.44E+04	9080	21388	8.24	7.99E-03	0.65
6/20/00	1.777E+06	5.73E+04	15145	64208	7.18	4.04E-03	0.98
5/20/00	1.041E+06	3.47E+04	9168	31824	9.49	9.12E-03	1.10
4/20/00	1.095E+06	3.53E+04	9332	32045	7.45	6.81E-03	0.83
3/20/00	1.069E+06	3.82E+04	10087	59576	9.52	8.91E-03	2.01
2/20/00	1.188E+06	3.83E+04	10125	32196	8.93	7.52E-03	0.92
1/20/00	1.239E+06	4.00E+04	10560	39321	8.55	6.90E-03	1.03
Maximum	2.282E+06	7.361E+04	19449	80941	1.390E+01	1.140E-02	2.01

40CFR 192
40CFR 141

E Dewayne King
08/19/2003 04:13 PM

To: Edward J Dallago/DALLEJ/CC01/INEEL/US@INEL
cc:
Fax to:
Subject: TRA Warm Waste Line

----- Forwarded by E Dewayne King/KINGED/CC01/INEEL/US on 08/19/2003 04:13 PM -----

Eddie D King
10/22/2001 04:00 PM

To: Loren M Gardner/GARDLM/CC01/INEEL/US@INEL
cc: R D Gibby/GIBBRD/CC01/INEEL/US@INEL
Fax to:
Subject: TRA Warm Waste Line

Mike.

Attached is the most recent data available on the warm waste line leak at TRA. Isotope specific alpha and beta emitter data is not yet available. Thus I used Am-241 as a surrogate radionuclide for gross alpha results, and Sr-90 as a surrogate for beta emitters.

I will update the table when alpha and beta isotope specific analytical data is available.

Note: If Sr-90 were to account for all the gross-beta, it would take approximately 27,300 liters (35.7 cubic yards) of soil, or approximately 357,000 liters (approx. 93,000 gallons) to exceed an RQ.

TEMP TRA WW Line Excavation

Please call me if you have any questions.

-Dewayne

DRAFT BASED ON PRELIMINARY DATA

10-16-01 30" Warm Waste Line Excavation Contamination Estimated Radionuclide Activity a

In accordance with 40 CFR 302.6(b) the 24-Hour release Reportable Quantity (RQ) for a radionuclide mixture is 1. 40 CFR 302.6(b)(2)(ii). If the identity and quantity (in curies) of each radionuclide in a released mixture or solution is known, the ratio between the quantity released (in curies) and the RQ for the radionuclide must be determined for each radionuclide. The only such releases subject to this section's notification requirements are those in which the sum of the ratios for the radionuclides in the mixture or solution released is equal to or greater than one.

The sum of the RQ ratios = **4.52E-03**
RQ = 1
Total estimated Ci release = **2.62E-02 Ci**

Table 1. Estimated radionuclide release based on water sample. [a]

Radionuclide	Sample Activity uCi/ml	Release [b,c] Ci	24-Hour RQ [d] Ci	24-Hour RQ Release Ratio	$t_{1/2}$ (h)	Exceeds RQ
Na-24	3.0E-06	1.19E-07	10	1.19E-08	14.96	NO
Cr-51	5.7E-05	7.60E-07	1000	7.60E-10	664.8	NO
Mn-54	1.0E-06	1.30E-08	10	1.30E-09	7492.8	NO
Co-60	1.92E-04	2.50E-06	10	2.50E-07	46174.0	NO
Nb-95	9.1E-06	1.21E-07	10	1.21E-08	839.3	NO
Zr-95	5.9E-06	7.75E-08	10	7.75E-09	1536.5	NO
Mo-99	5.0E-07	8.37E-09	100	8.37E-11	65.9	NO
Sb-124	6.1E-07	8.02E-09	10	8.02E-10	1444.8	NO
Cs-137	1.03E-05	1.34E-07	1	1.34E-07	264289.2	NO
Eu-152	2.9E-05	3.77E-07	10	3.77E-08	118084.8	NO
Eu-154	2.9E-05	3.77E-07	10	3.77E-08	118084.8	NO
Eu-155	1.08E-05	1.40E-07	10	1.40E-08	41259.6	NO
Hf-181	7.0E-06	9.25E-08	10	9.25E-09	1017.6	NO
Gross Alpha [e,f]	8.0E-07	1.04E-08	0.01	1.04E-06	3784320.0	NO
Gross Beta [g]	2.8E-04	3.64E-06	0.1	3.64E-05	254916	NO
Totals	-	4.72E-06	-	5.17E-07	-	

a. Analytical results are from RML ID #A1101701064. Gross Alpha and Gross Beta in this estimate. Analytical data is not yet available for isotopic alpha and beta emitters.

b. Estimated liquid volume = 13 liters
Volume scaled from photograph (4" pipe diameter). Standing liquid dimensions approximately (18.7" x 10. 7" x 4")

c. Decay correction, t = 2.40E+01 hours

d. 40 CFR 302 reportable quantities (RQ).

e. No gross alpha detection. MDA is the concentration used as a surrogate for the concentration.

f. In the evaluation if an RQ is exceeded, Gross Alpha is assumed represented as Am-241. Of the probable alpha emitters present, Am-241 has one of the lowest RQs (0.01).

g. In the evaluation if an RQ is exceeded, Gross Beta is assumed represented as Sr-90. Of the probable beta, emitters presen, Sr-90 has one of the lowest RQs (0.1).

TEMP TRA WW Line Excavation.xls
10/18/01

DRAFT BASED ON PRELIMINARY DATA

Table 2. Estimated radionuclide release based on soil sample.

Radionuclide	Sample Activity uCi/g	Release [b,c] Ci	24-Hour RQ [d] Ci	24-Hour RQ Release Ratio	$t_{1/2}$ (h)	Exceeds RQ
Na-24	7E-07	7.98E-06	10	7.98E-07	14.96	NO
Cr-51	4.5E-04	1.73E-03	1000	1.73E-06	664.8	NO
Mn-54	3.6E-05	1.35E-04	10	1.35E-05	7492.8	NO
Co-58	2.6E-05	9.99E-05	1000	9.99E-08	664.8	NO
Co-60	4.6E-03	1.72E-02	10	1.72E-03	46173.96	NO
Zn-65	1.68E-04	6.31E-04	10	6.31E-05	5851.2	NO
Nb-95	8.4E-05	3.21E-04	10	3.21E-05	839.28	NO
Zr-95	4.1E-05	1.55E-04	10	1.55E-05	1536.48	NO
Ru-103	3.7E-06	1.41E-05	10	1.41E-06	942.48	NO
Cs-134	3.9E-05	1.46E-04	1	1.46E-04	264289.2	NO
Cs-137	5.5E-04	2.06E-03	1	2.06E-03	264289.2	NO
Ce-144	2.8E-05	1.05E-04	1	1.05E-04	6830.4	NO
Eu-152	3.4E-04	1.27E-03	10	1.27E-04	118084.8	NO
Eu-154	3.7E-04	1.39E-03	10	1.39E-04	118084.8	NO
Eu-155	1.17E-04	4.39E-04	10	4.39E-05	41259.6	NO
Hf-181	8.8E-05	3.35E-04	10	3.35E-05	1017.6	NO
Ta-182	1.7E-05	6.41E-05	10	6.41E-06	2746.3	NO
Gross Alpha [f,g]	4.9E-06	1.84E-05	0.01	1.84E-03	3784320.0	NO
Gross Beta [h]	1.8E-03	6.86E-03	0.1	6.86E-02	254916	NO
Totals	-	2.62E-02	-	4.52E-03	-	

a. Alpha and Beta emitters are not included in this estimate. Gross Alpha and Gross Beta in this estimate. Analytical data is not yet available for isotopic alpha and beta emitters.

b. Estimated soil volume removed = 1874 liters (9 55-gallon drums)(1 cubic yard = 764.55 liters)

c. Decay correction, t = 2.40E+01 hours

d. 40 CFR 302 reportable quantities (RQ).

e. Estimated soil density = 2 g/mL

f. In the evaluation if an RQ is exceeded, Gross Alpha is assumed represented as Am-241. Of the probable alpha emitters present Am-241 has one of the lowest RQs (0.01).

g. In the evaluation if an RQ is exceeded, Gross Beta is assumed represented as Sr-90. Of the probable beta emitters presen, Sr-90 has one of the lowest RQs (0.1).

Decay Equation

$m_0 = m_t / e^{-Lt}$

$L = 0.6931 / t_{1/2}$

TEMP TRA WW Line Excavation.xls
10/18/01

INEEL

INTEROFFICE MEMORANDUM

Date: October 18, 2001

To: Leroy Ewing MS 7132 3-4363

From: John Eisenmenger MS 7113 3-4091

Subject: TRA 605 Warm Waste Piping Replacement (00JT)

JGE-05-2001

Two samples were submitted to TRA radiochemistry for gross alpha, gross beta, beta isotopic and alpha isotopic. One sample was a dirty water and the other was a wet soil.

Below are the gross alpha and gross results for the two samples. The isotopic results will be reported at a later time.

Lab Sample ID	Customer Sample ID	Analysis	Result	Units	Uncertainty (1 sigma)	MDA
00JT-01	TRA 605 Soil	Gross Alpha	Not detected	pCi/g		4.9
00JT-01	TRA 605 Soil	Gross Beta	1830	pCi/g	75	9.0
00JT-02	TRA 605 Water	Gross Alpha	Not detected	pCi/ml		0.8
00JT-02	TRA 605 Water	Gross Beta	280	pCi/ml	12	1.7

The uncertainties given are one standard deviation and show the precision with which the measurements were made. They include uncertainties incurred throughout the measurement process. A blank was run with the samples.

If you have any questions, feel free to call me at 533-4091.

cc: Anita Freeman (file) MS 7111
Russ Cummins MS 7111
Julie Lopez MS 7110
David King MS 7112
Chere Morgan MS 7110

Eddie D King 10/25/2001 08:30 AM

To: Brad L Swanson/SWANBL/CC01/INEEL/US@INEL, R D Gibby/GIBBRD/CC01/INEEL/US@INEL, Chere D Morgan/CHER/CC01/INEEL/US@INEL
cc: Joe C Midgett/MIDGJC/CC01/INEEL/US@INEL
Subject: TRA 605 WARM WASTE H3

FYI.

The H-3 analytical result for the warm waste line contamination is:

9.35E+03 pCi/ml (at this concentration, 1.07E+07 liters (2.8E+06 gal.) would exceed the 24-hour RQ of 100 Ci)

The concentration is consistent with discharges to the warm waste pond (2.23E+03 pCi/ml to 1.14E+04 pCi/ml past 21 months). Monthly effluent volume over the past 21 months ranged 9.4E+05 liters to 2.3E+06 liters.

-Dewayne King

---------- Forwarded by Eddie D King/KINGED/CC01/INEEL/US on 10/25/2001 07:54 AM ----------

Russell L Cummins
10/24/2001 01:35 PM

To: Leroy E Ewing/EWG/CC01/INEEL/US@INEL
cc: Julie J Lopez/JLL/CC01/INEEL/US@INEL, David R King/KINGDR/CC01/INEEL/US@INEL, Eddie D King/KINGED/CC01/INEEL/US@INEL
Subject: TRA 605 WARM WASTE H3

Leroy, here is the Tritium result for the TRA 605 H2O sample.

H3 Results **TRA 605 WARM WASTE PIPING REPLACEMENT**

Sample ID	Result	Units	1 sigma uncertainty	MDA
TRA 605 H2O	9.35E+03	pCi/ml	4.21E+02	2.12E+00

Analyzed by: Russell Cummins
Approved by: John Eisenmenger

Idaho National Engineering and Environmental Laboratory

INTEROFFICE MEMORANDUM

Date: October 25, 2001

To:	J. J. Lopez	MS 7110	3-4067
From:	K. F. Martin	MS 7111	3-4064

Subject: RML GAMMA-RAY ANALYSIS OF ONE TRA 605 WARM WASTE SOIL/RESIN SAMPLE KFM-092-01

One 605 warm waste soil/resin sample was counted/screened for radioactivity by the Radiation Measurements Laboratory (RML) using standardized high-resolution gamma-ray spectrometry techniques. The sample was counted for 2 hour. The analysis results are recorded on the attached table 1.

Attachment: As Stated

cc.
A. L. Freeman, MS 7111
JW Rogers, MS 7113
T. C. Sorensen, MS 7111
K. F. Martin File

Uniform File Code:
Disposition Authority:
Retention Schedule:

NOTE: Original disposition authority, retention schedule, and Uniform Filing Code applied by the sender may not be appropriate for all recipients. Make adjustments as needed.

TABLE 1

RADIATION MEASUREMENTS LABORATORY

GAMMA-RAY ANALYSIS RESULTS

TRA 605 WARM WASTE EXCAVATION SOIL/RESIN

Sample ID	RML ID	Manmade Radionuclides	Activity				Estimated Bias (%)
605 SOIL/RSN	D4102301072	CR-51	(7.0	+/-	0.5)E+03	pCi/GM	0.0
		MN-54	(8.9	+/-	0.6)E+01	pCi/GM	0.0
		CO-57	(3.9	+/-	0.3)E+02	pCi/GM	0.0
		CO-58	(1.14	+/-	0.08)E+02	pCi/GM	0.0
		FE-59	(1.95	+/-	0.18)E+01	pCi/GM	0.0
		CO-60	(1.03	+/-	0.07)E+04	pCi/GM	0.0
		ZN-65	(3.7	+/-	0.3)E+02	pCi/GM	0.0
		ZR-95	(4.5	+/-	0.3)E+02	pCi/GM	0.0
		NB-95	(7.1	+/-	0.5)E+02	pCi/GM	0.0
		RU-103	(5.4	+/-	0.4)E+01	pCi/GM	0.0
		RURH-106	(2.18	+/-	0.17)E+02	pCi/GM	0.0
		CS-134	(7.7	+/-	0.6)E+01	pCi/GM	0.0
		CS-137	(6.6	+/-	0.5)E+02	pCi/GM	0.0
		CE-141	(1.45	+/-	0.16)E+01	pCi/GM	0.0
		CE-144	(1.9	+/-	0.2)E+02	pCi/GM	0.0
		EU-152	(5.2	+/-	0.4)E+02	pCi/GM	0.0
		EU-154	(4.6	+/-	0.3)E+02	pCi/GM	0.0
		EU-155	(1.56	+/-	0.11)E+02	pCi/GM	0.0
		HF-181	(8.0	+/-	0.6)E+02	pCi/GM	0.0
		TA-182	(7.7	+/-	0.6)E+01	pCi/GM	0.0

Notes: (1) A "None Detected" under "Manmade Radionuclides" means that the analyst determined that no manmade true-positive radionuclides were present in the respective sample(s).

(2) The uncertainty associated with any reported activity includes the statistical uncertainty and estimated uncertainties in the detector efficiency and the sample geometry (both are typically 5%). Uncertainties are propagated in quadrature and expressed as one standard deviation.

(3) When a sample's matrix differs radically from that of the calibration standard used by the RML, the measured activity may not accurately represent the true radionuclide concentration in that sample. In such cases, a non-zero estimated bias is applied in place of the estimated sample geometry; this bias is not propagated into the total uncertainty and is listed separately.

Idaho National Engineering and Environmental Laboratory

INTEROFFICE MEMORANDUM

Date: October 18, 2001

To: L. E. Ewing MS 7132 3-4363

From: J. A. Daley MS 7111 3-4184

Subject: RML GAMMA-RAY ANALYSIS OF TRA 605 WARM WASTE PIPING REPLACEMENT SAMPLES - JAD-079-01

Two samples (one liquid and one soil) were counted/screened for radioactivity content by the Radiation Measurements Laboratory (RML) using standardized high-resolution gamma-ray spectrometry techniques. The samples were counted in a standardized and calibrated geometry for 2 hours. The analysis results are recorded on the attached Table 1.

Attachment: As Stated

cc:
A. L. Freeman, MS 7111
D. R. King, MS 7112
J. J. Lopez, MS 7110
G. D. McLaughlin, MS 7113
JW Rogers, MS 7113
T. C. Sorensen, MS 7111
J. A. Daley File

Uniform File Code: 6404
Disposition Authority: ENV5-c-1
Retention Schedule: Destroy in 75 years

NOTE: Original disposition authority, retention schedule, and Uniform Filing Code applied by the sender may not be Appropriate for all recipients. Make adjustments as needed.

TABLE 1

RADIATION MEASUREMENTS LABORATORY

GAMMA-RAY ANALYSIS RESULTS

TRA 605 WARM WASTE PIPING REPLACEMENT 2 HOUR COUNTS

Sample ID	RML ID	Manmade Radionuclides	Activity	Estimated Bias (%)
TRA 605 H20	A1101701064	NA-24	(3.0 +/- 0.5)E-06 uCi/ML	0.0
		CR-51	(5.7 +/- 0.4)E-05 uCi/ML	0.0
		MN-54	(1.0 +/- 0.3)E-06 uCi/ML	0.0
		CO-60	(1.92 +/- 0.14)E-04 uCi/ML	0.0
		ZR-95	(5.9 +/- 0.7)E-06 uCi/ML	0.0
		NB-95	(9.1 +/- 0.8)E-06 uCi/ML	0.0
		MO-99	(5.0 +/- 0.8)E-07 uCi/ML	0.0
		SB-124	(6.1 +/- 1.5)E-07 uCi/ML	0.0
		CS-137	(1.03 +/- 0.09)E-05 uCi/ML	0.0
		EU-152	(2.9 +/- 0.2)E-05 uCi/ML	0.0
		EU-154	(2.9 +/- 0.2)E-05 uCi/ML	0.0
		EU-155	(1.08 +/- 0.08)E-05 uCi/ML	0.0
		HF-181	(7.0 +/- 0.5)E-06 uCi/ML	0.0
TRA 605 SOIL	A2101701065	NA-24	(7 +/- 3)E-07 uCi/GM	0.0
		CR-51	(4.5 +/- 0.3)E-04 uCi/GM	0.0
		MN-54	(3.6 +/- 0.3)E-05 uCi/GM	0.0
		CO-58	(2.6 +/- 0.2)E-05 uCi/GM	0.0
		CO-60	(4.6 +/- 0.3)E-03 uCi/GM	0.0
		ZN-65	(1.68 +/- 0.12)E-04 uCi/GM	0.0
		ZR-95	(4.1 +/- 0.3)E-05 uCi/GM	0.0
		NB-95	(8.4 +/- 0.6)E-05 uCi/GM	0.0
		RU-103	(3.7 +/- 0.8)E-06 uCi/GM	0.0
		CS-134	(3.9 +/- 0.3)E-05 uCi/GM	0.0
		CS-137	(5.5 +/- 0.4)E-04 uCi/GM	0.0
		CE-144	(2.8 +/- 0.6)E-05 uCi/GM	0.0
		EU-152	(3.4 +/- 0.3)E-04 uCi/GM	0.0
		EU-154	(3.7 +/- 0.3)E-04 uCi/GM	0.0
		EU-155	(1.17 +/- 0.08)E-04 uCi/GM	0.0
		HF-181	(8.8 +/- 0.6)E-05 uCi/GM	0.0
		TA-182	(1.7 +/- 0.2)E-05 uCi/GM	0.0

Please see the notes on the following page.

TABLE 1 CONTINUED

Sample ID	RML ID	Manmade Radionuclides	Activity	Estimated Bias (%)

otes: (1) A "None Detected" under "Manmade Radionuclides" means that the analyst determined that no manmade true-positive radionuclides were present in the respective sample(s).
(2) The uncertainty associated with any reported activity includes the statistical uncertainty and estimated uncertainties in the detector efficiency and the sample geometry (both are typically 5%). Uncertainties are propagated in quadrature and expressed as one standard deviation.
(3) When a sample's matrix differs radically from that of the calibration standard used by the RML, the measured activity may not accurately represent the true radionuclide concentration in that sample. In such cases, a non-zero estimated bias is applied in place of the estimated sample geometry; this bias is not propagated into the total uncertainty and is listed separately.

REPORATABLE QUANTITY CALCULATIONS FOR 40 CFR 302.6(b) COMPLIANCE

Revised 10/25/01

30" Warm Waste Line Excavation Contamination Estimated Radionuclide Activity and 40 CFR 302 RQ Comparision

On 10/09/01, during excavation for the TRA 30" Warm Waste Line replacement, radiological soil contamination was encountered. A soil sample was collected for radiological analyses. On 10/16/01 a 4" warm waste line was uncovered and discovered to be leaking. A water and soil sample was collected for radiological analyses. On 10/18/01 approximately 2 cups of resin was discovered in the soil. A soil/resin sample was collected for radiological analyses. These Release Quantity (RQ) calculations are based on the 10/16/01 water sample and the 10/18/01soil/water sample.

In accordance with 40 CFR 302.6(b) the 24-Hour release RQ for a radionuclide mixture is 1. 40 CFR 302.6(b)(2)(ii). If the identity and quantity (in curies) of each radionuclide in a released mixture or solution is known, the ratio between the quantity released (in curies) and the RQ for the radionuclide must be determined for each radionuclide. The only such releases subject to this section's notification requirements are those in which the sum of the ratios for the radionuclides in the mixture or solution released is equal to or greater than one.

RQ (Sum of Ratios) = 1

The sum of the RQ ratios = **8.01E-02** (Significant contribution from gross beta assumed to be Sr-90)

Total estimated Ci release = **9.28E-02 Ci**

Table 1. Estimated radionuclide release based on water sample. [a,h]

Radionuclide	Sample Activity uCi/ml	Release [b,c] Ci	24-Hour RQ [d] Ci	24-Hour RQ Release Ratio	$t_{1/2}$ (h)	Exceeds RQ
H-3 [h]	9.35E-03	1.22E-04	100	1.22E-06	107748	NO
Na-24	3.0E-06	1.19E-07	10	1.19E-08	14.96	NO
Cr-51	5.7E-05	7.60E-07	1000	7.60E-10	664.8	NO
Mn-54	1.0E-06	1.30E-08	10	1.30E-09	7492.8	NO
Co-60	1.92E-04	2.50E-06	10	2.50E-07	46174.0	NO
Nb-95	9.1E-06	1.21E-07	10	1.21E-08	839.3	NO
Zr-95	5.9E-06	7.75E-08	10	7.75E-09	1536.5	NO
Mo-99	5.0E-07	8.37E-09	100	8.37E-11	65.9	NO
Sb-124	6.1E-07	8.02E-09	10	8.02E-10	1444.8	NO
Cs-137	1.03E-05	1.34E-07	1	1.34E-07	264289.2	NO
Eu-152	2.9E-05	3.77E-07	10	3.77E-08	118084.8	NO
Eu-154	2.9E-05	3.77E-07	10	3.77E-08	118084.8	NO
Eu-155	1.08E-05	1.40E-07	10	1.40E-08	41259.6	NO
Hf-181	7.0E-06	9.25E-08	10	9.25E-09	1017.6	NO
Gross Alpha [e,f]	8.0E-07	1.04E-08	0.01	1.04E-06	3784320.0	NO
Gross Beta [g]	2.8E-04	3.64E-06	0.1	3.64E-05	254916	NO
Totals	-	1.30E-04	-	3.92E-05	-	-

a. Analytical results are listed in the 10-18-01 J. A. Daley letter to L. E. Ewing (JAD-079-01), RML ID # A1101701064. Other than H-3, analytical data is not yet available for isotopic alpha and beta emitters.

b. Estimated liquid volume = 1.30E+01 liters
Volume scaled from photograph (4" pipe diameter). Standing liquid dimensions approximately (18.7" x 10. 7" x 4")

c. Decay correction, t = 2.40E+01 hours
Decay correction equation $A_0 = A / e^{-Lt}$ L = $0.6931 / t_{1/2}$

d. 40 CFR 302 reportable quantities (RQ).

e. No gross alpha detection. MDA is the concentration used as a surrogate for the concentration.

f. Analytical results are listed in 10-18-01 John Eisenmenger letter to Leroy Ewing (JGE-05-2001). In the evaluation if an RQ is exceeded, Gross Alpha is assumed represented as Am-241. Of the probable alpha emitters present Am-241 has one of the lowest RQs (0.01).

g. Analytical results are listed in 10-18-01 John Eisenmenger letter to Leroy Ewing (JGE-05-2001). In the evaluation if an RQ is exceeded Gross Beta is assumed represented as Sr-90. Of the probable beta emitters presen, Sr-90 has one of the lowest RQs (0.1).

h. Analytical results are listed in 10-24-01 R. L. Cummins e-mail to L. E. Ewing.

REPORATABLE QUANTITY CALCULATIONS FOR 40 CFR 302.6(b) COMPLIANCE

Table 2. Estimated radionuclide release based on soil sample.

Radionuclide	Sample Activity pCi/g	Release [b,c] Ci	24-Hour RQ [d] Ci	24-Hour RQ Release Ratio	$t_{1/2}$ (h)	Exceeds RQ
Na-24	7E-01	7.98E-06	10	7.98E-07	14.96	NO
Cr-51*	7.0E+03	2.69E-02	1000	2.69E-05	664.8	NO
Mn-54	8.9E+01	3.34E-04	10	3.34E-05	7492.8	NO
Co-57	3.9E+02	1.47E-03	100	1.47E-05	6523.2	NO
Co-58	1.14E+02	4.38E-04	1000	4.38E-07	664.8	NO
Fe-59	1.95E+01	7.42E-05	10	7.42E-06	1068.24	NO
Co-60	1.03E+04	3.86E-02	10	3.86E-03	46173.96	NO
Zn-65	3.70E+02	1.39E-03	10	1.39E-04	5851.2	NO
Nb-95	7.1E+02	2.71E-03	10	2.71E-04	839.28	NO
Zr-95	4.5E+02	1.70E-03	10	1.70E-04	1536.48	NO
Ru-103	5.4E+01	2.06E-04	10	2.06E-05	942.48	NO
Ru/Rh-106	2.18E+02	8.19E-04	1	8.19E-04	8942.4	NO
Cs-134	7.7E+01	2.89E-04	1	2.89E-04	264289.2	NO
Cs-137	6.6E+02	2.47E-03	1	2.47E-03	264289.2	NO
Ce-141	1.45E+01	5.55E-05	10	5.55E-06	780	NO
Ce-144	1.9E+02	7.14E-04	1	7.14E-04	6830.4	NO
Eu-152	5.2E+02	1.95E-03	10	1.95E-04	118084.8	NO
Eu-154	4.6E+02	1.72E-03	10	1.72E-04	118084.8	NO
Eu-155	1.56E+02	5.85E-04	10	5.85E-05	41259.6	NO
Hf-181	8.0E+02	3.05E-03	10	3.05E-04	1017.6	NO
Ta-182	7.7E+01	2.90E-04	10	2.90E-05	2746.3	NO
Gross Alpha [f,g]	4.9E+00	1.84E-05	0.01	1.84E-03	3784320.0	NO
Gross Beta [h]	1.8E+03	6.86E-03	0.1	6.86E-02	254916	NO
Totals	-	9.27E-02	-	8.00E-02	-	-

a. Analytical results are from RML Sample ID # D4102301072.
Analytical data is not yet available for isotopic alpha and beta emitters.

b. Estimated soil volume removed = 1874 liters (9 55-gallon drums)(1 cubic yard = 764.55 liters)

c. Decay correction, t = 2.40E+01 hours
Decay correction equation $A_0 = A / e^{-Lt}$ L = $0.6931 / t_{1/2}$

d. 40 CFR 302 reportable quantities (RQ).

e. Estimated soil density = 2 g/mL

f. Analytical results are listed in 10-18-01 John Eisenmenger letter to Leroy Ewing (JGE-05-2001). In the evaluation if an RQ is exceeded, Gross Alpha is assumed represented as Am-241. Of the probable alpha emitters present Am-241 has one of the lowest RQs (0.01).

g. Analytical results are listed in 10-18-01 John Eisenmenger letter to Leroy Ewing (JGE-05-2001). In the evaluation if an RQ is exceeded Gross Beta is assumed represented as Sr-90. Of the probable beta emitters presen, Sr-90 has one of the lowest RQs (0.1).

2.45081 cu yd.

REPORATABLE QUANTITY CALCULATIONS FOR 40 CFR 302.6(b) COMPLIANCE

21 Month Maximum Daily Effluent Discharge To TRA Evaporation Pond Bounding Calculation

The following table uses the maximum daily effluent discharge to the TRA Evaporation Pond to bound a worst case scenario for 24-hour release to the soil. The maximum was 3.06E+05 liters (80941 gallons).

The sum of the RQ ratios = **9.22E-01** (Significant contribution from gross beta assumed to be Sr-90)

Total estimated Ci release = **3.15E-03 Ci**

Since the gross beta is a significant contribution to the release calculations, and Sr-90 is assumed to represent the gross beta results pending isotope specific data, a 21 month review of Sr-90 discharge to the TRA Evaporation Pond was performed. The maximum monthly discharge of Sr-90 was 0.099 Ci.

It is highly unlikely that the Sr-90 24-hour RQ was exceeded since the bounding calculation is based on the maximum daily flow and the maximum monthly Sr-90 discharge does not exceed the Sr-90 RQ.

Table 3. Bouding calculation based 21 month maximum daily flow. [a,h]

Radionuclide	Sample Activity uCi/ml	Release [b,c] Ci	24-Hour RQ [d] Ci	24-Hour RQ Release Ratio	$t_{1/2}$ (h)	Exceeds RQ
H-3 [h]	9.35E-03	2.86E+00	100	2.86E-02	107748	NO
Na-24	3.0E-06	2.79E-03	10	2.79E-04	14.96	NO
Cr-51	5.7E-05	1.79E-02	1000	1.79E-05	664.8	NO
Mn-54	1.0E-06	3.07E-04	10	3.07E-05	7492.8	NO
Co-60	1.92E-04	5.88E-02	10	5.88E-03	46174.0	NO
Nb-95	9.1E-06	2.84E-03	10	2.84E-04	839.3	NO
Zr-95	5.9E-06	1.83E-03	10	1.83E-04	1536.5	NO
Mo-99	5.0E-07	1.97E-04	100	1.97E-06	65.9	NO
Sb-124	6.1E-07	1.89E-04	10	1.89E-05	1444.8	NO
Cs-137	1.03E-05	3.15E-03	1	3.15E-03	264289.2	NO
Eu-152	2.9E-05	8.88E-03	10	8.88E-04	118084.8	NO
Eu-154	2.9E-05	8.88E-03	10	8.88E-04	118084.8	NO
Eu-155	1.08E-05	3.31E-03	10	3.31E-04	41259.6	NO
Hf-181	7.0E-06	2.18E-03	10	2.18E-04	1017.6	NO
Gross Alpha [e,f]	8.0E-07	2.45E-04	0.01	2.45E-02	3784320.0	NO
Gross Beta [g]	2.6E-04	8.57E-02	0.1	8.57E-01	254916	NO
Totals	-	3.06E+00	-	9.22E-01	-	-

a. Analytical results are listed in the 10-18-01 J. A. Daley letter to L. E. Ewing (JAD-079-01), RML ID # A1101701064. Other than H-3, analytical data is not yet available for isotopic alpha and beta emitters.

b. Estimated liquid volume = 3.06E+05 liters
21 month history maximum daily flow on 01/25/01 of 80941 gallons.

c. Decay correction, t = 2.40E+01 hours
Decay correction equation $A_0 = A / e^{-Lt}$ L = $0.6931 / t_{1/2}$

d. 40 CFR 302 reportable quantities (RQ).

e. No gross alpha detection. MDA is the concentration used as a surrogate for the concentration.

f. Analytical results are listed in 10-18-01 John Eisenmenger letter to Leroy Ewing (JGE-05-2001). In the evaluation if an RQ is exceeded, Gross Alpha is assumed represented as Am-241. Of the probable alpha emitters present Am-241 has one of the lowest RQs (0.01).

g. Analytical results are listed in 10-18-01 John Eisenmenger letter to Leroy Ewing (JGE-05-2001). In the evaluation if an RQ is exceeded Gross Beta is assumed represented as Sr-90. Of the probable beta emitters presen, Sr-90 has one of the lowest RQs (0.1).

h. Analytical results are listed in 10-24-01 R. L. Cummins e-mail to L. E. Ewing.

10/25/01

Tritium Review (H-3)

Water sampled (10/16/01) at the TRA 30" Warm Waste Replacement Project excavation had a H-3 concentration of:

9.35E+03 pCi/mL (1.07E+07 liters would cause the 24 hour RQ to be exceeded)

For comparision, the past twenty-one months H-3 discharge to the TRA Evaporation is summarized below.
The Reportable Quantity (RQ) for H-3 is 100 curies.

Month Ending	Total Monthly Effluent Volume (L)	Average Daily Effluent Volume (L)	Average Daily Effluent Volume (gal)	Maximum Daily Effluent Volume (gal)	Total Curies (Ci)	Curie Concentration (uCi/ml)	Maximum Curie Per Day (Ci/day)
9/20/01	2.079E+06	6.71E+04	17718	56533	13.9	6.71E-03	1.44
8/20/01	1.153E+06	3.72E+04	9827	53640	7	6.07E-03	1.23
7/20/01	2.198E+06	7.33E+04	19357	52702	6.02	2.74E-03	0.55
6/20/01	2.149E+06	6.93E+04	18315	37811	1.96	9.14E-04	0.13
5/20/01	1.982E+06	6.61E+04	17455	41609	8.64	4.36E-03	0.69
4/20/01	1.915E+06	6.18E+04	16321	60014	4.27	2.23E-03	0.51
3/20/01	1.252E+06	4.32E+04	11406	61670	10.4	8.29E-03	1.94
2/20/01	1.713E+06	5.53E+04	14599	80941	5.95	3.47E-03	1.06
1/20/01	2.151E+06	6.94E+04	18332	64638	1.39	6.46E-04	0.16
12/20/00	1.066E+06	3.55E+04	9388	16243	7.86	7.37E-03	0.45
11/20/00	2.282E+06	7.36E+04	19449	74425	6.5	2.85E-03	0.80
10/20/00	1.531E+06	5.10E+04	13483	44927	10.1	6.60E-03	1.12
9/20/00	9.369E+05	3.02E+04	7985	8000	10.7	1.14E-02	0.35
8/20/00	1.985E+06	6.40E+04	16917	46465	8.91	4.49E-03	0.79
7/20/00	1.031E+06	3.44E+04	9080	21388	8.24	7.99E-03	0.65
6/20/00	1.777E+06	5.73E+04	15145	64208	7.18	4.04E-03	0.98
5/20/00	1.041E+06	3.47E+04	9168	31824	9.49	9.12E-03	1.10
4/20/00	1.095E+06	3.53E+04	9332	32045	7.45	6.81E-03	0.83
3/20/00	1.069E+06	3.82E+04	10087	59576	9.52	8.91E-03	2.01
2/20/00	1.188E+06	3.83E+04	10125	32196	8.93	7.52E-03	0.92
1/20/00	1.239E+06	4.00E+04	10560	39321	8.55	6.90E-03	1.03
Maximum	2.282E+06	7.361E+04	19449	80941	1.390E+01	1.140E-02	2.01

40CFR 192
40CFR141